Marketing

September 9, 2024

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

[2]:
```
data = pd.read_excel('data.xlsx')
```

[3]:
```
data.head()
```

[3]:

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitude	Latitude	Cuisines	Average Cost for two
0	7402935	Skye	94	Jakarta	Menara BCA, Lantai 56, Jl. MH. Thamrin, Thamri…	Grand Indonesia Mall, Thamrin	Grand Indonesia Mall, Thamrin, Jakarta	106.821999	-6.196778	Italian, Continental	800000
1	7410290	Satoo - Hotel Shangri-La	94	Jakarta	Hotel Shangri-La, Jl. Jend. Sudirman	Hotel Shangri-La, Sudirman	Hotel Shangri-La, Sudirman, Jakarta	106.818961	-6.203292	Asian, Indonesian, Western	800000
2	7420899	Sushi Masa	94	Jakarta	Jl. Tuna Raya No. 5, Penjaringan	Penjaringan	Penjaringan, Jakarta	106.800144	-6.101298	Sushi, Japanese	500000
3	7421967	3 Wise Monkeys	94	Jakarta	Jl. Suryo No. 26, Senopati, Jakarta	Senopati	Senopati, Jakarta	106.813400	-6.235241	Japanese	450000
4	7422489	Avec Moi Restaurant and Bar	94	Jakarta	Gedung PIC, Jl. Teluk Betung 43, Thamrin, Jakarta	Thamrin	Thamrin, Jakarta	106.821023	-6.196270	French, Western	350000

```
                 Currency Has Table booking Has Online delivery  Price range  \
0  Indonesian Rupiah(IDR)                No                  No            3
1  Indonesian Rupiah(IDR)                No                  No            3
2  Indonesian Rupiah(IDR)                No                  No            3
3  Indonesian Rupiah(IDR)                No                  No            3
4  Indonesian Rupiah(IDR)                No                  No            3

   Aggregate rating Rating color Rating text  Votes
0               4.1        Green   Very Good   1498
1               4.6   Dark Green   Excellent    873
2               4.9   Dark Green   Excellent    605
3               4.2        Green   Very Good    395
4               4.3        Green   Very Good    243
```

[6]:
```
cc = pd.read_excel('Country-Code.xlsx')
df= pd.merge(data,cc,on='Country Code',how='left')
df.head()
```

[6]:
```
   Restaurant ID              Restaurant Name  Country Code     City  \
0        7402935                         Skye            94  Jakarta
1        7410290     Satoo - Hotel Shangri-La            94  Jakarta
2        7420899                  Sushi Masa            94  Jakarta
3        7421967               3 Wise Monkeys            94  Jakarta
4        7422489  Avec Moi Restaurant and Bar            94  Jakarta

                                        Address  \
0  Menara BCA, Lantai 56, Jl. MH. Thamrin, Thamri…
1              Hotel Shangri-La, Jl. Jend. Sudirman
2                  Jl. Tuna Raya No. 5, Penjaringan
3               Jl. Suryo No. 26, Senopati, Jakarta
4  Gedung PIC, Jl. Teluk Betung 43, Thamrin, Jakarta

                     Locality                       Locality Verbose  \
0  Grand Indonesia Mall, Thamrin  Grand Indonesia Mall, Thamrin, Jakarta
1     Hotel Shangri-La, Sudirman     Hotel Shangri-La, Sudirman, Jakarta
2                    Penjaringan                    Penjaringan, Jakarta
3                       Senopati                       Senopati, Jakarta
4                        Thamrin                        Thamrin, Jakarta

    Longitude  Latitude                    Cuisines  Average Cost for two  \
0  106.821999 -6.196778        Italian, Continental                800000
1  106.818961 -6.203292  Asian, Indonesian, Western                800000
2  106.800144 -6.101298             Sushi, Japanese                500000
3  106.813400 -6.235241                    Japanese                450000
4  106.821023 -6.196270             French, Western                350000

                 Currency Has Table booking Has Online delivery  Price range  \
```

```
0  Indonesian Rupiah(IDR)                No                  No            3
1  Indonesian Rupiah(IDR)                No                  No            3
2  Indonesian Rupiah(IDR)                No                  No            3
3  Indonesian Rupiah(IDR)                No                  No            3
4  Indonesian Rupiah(IDR)                No                  No            3

   Aggregate rating Rating color Rating text  Votes    Country
0               4.1        Green   Very Good   1498  Indonesia
1               4.6   Dark Green   Excellent    873  Indonesia
2               4.9   Dark Green   Excellent    605  Indonesia
3               4.2        Green   Very Good    395  Indonesia
4               4.3        Green   Very Good    243  Indonesia
```

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

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 9551 entries, 0 to 9550
Data columns (total 20 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   Restaurant ID         9551 non-null   int64
 1   Restaurant Name       9550 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  Price range           9551 non-null   int64
 15  Aggregate rating      9551 non-null   float64
 16  Rating color          9551 non-null   object
 17  Rating text           9551 non-null   object
 18  Votes                 9551 non-null   int64
 19  Country               9551 non-null   object
dtypes: float64(3), int64(5), object(12)
memory usage: 1.5+ MB
```

[9]:
```
# To check if data has duplicates
df.duplicated().sum()
```

[9]: 0

[10]:
```
# To check the Null count by columns
df.isnull().sum()
```

[10]:
```
Restaurant ID           0
Restaurant Name         1
Country Code            0
City                    0
Address                 0
Locality                0
Locality Verbose        0
Longitude               0
Latitude                0
Cuisines                9
Average Cost for two    0
Currency                0
Has Table booking       0
Has Online delivery     0
Price range             0
Aggregate rating        0
Rating color            0
Rating text             0
Votes                   0
Country                 0
dtype: int64
```

[13]:
```
# To drop the null values in Restaurant Column
df['Restaurant Name'].dropna(inplace=True)
```

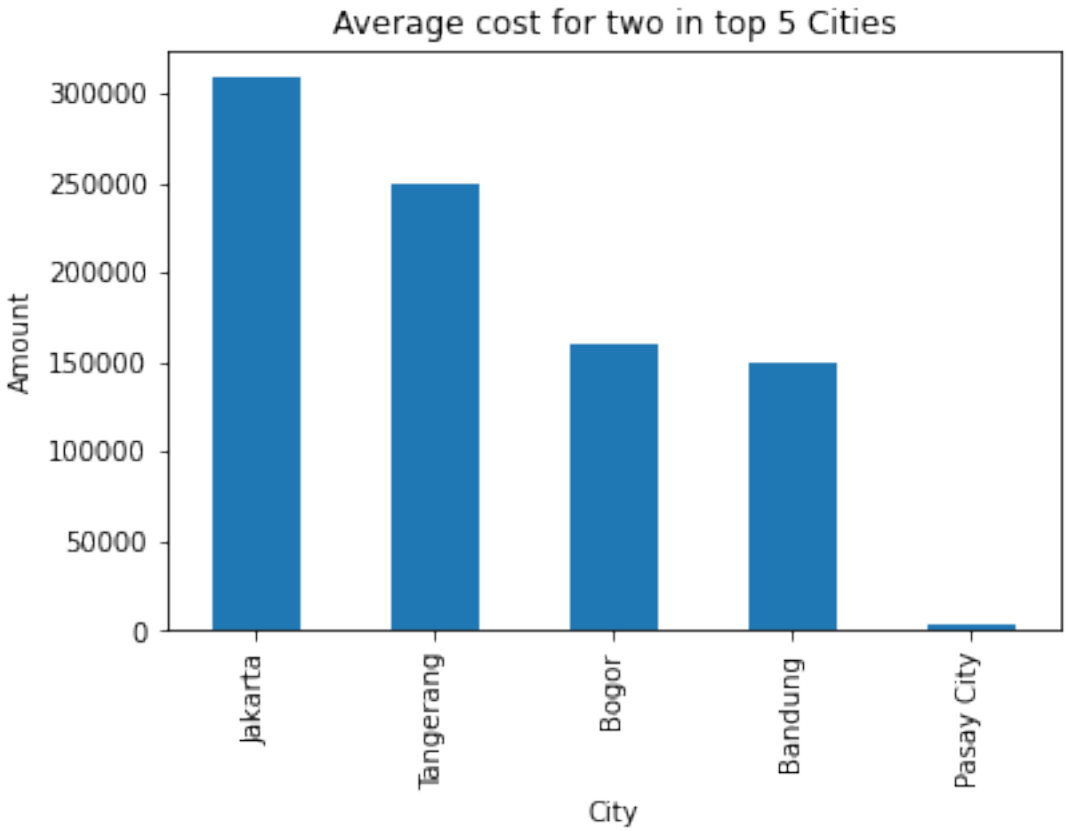
[14]:
```
# To replace null values with "others" in Cuisines Column
df['Cuisines'].fillna("Others",inplace=True)
```

[15]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 9551 entries, 0 to 9550
Data columns (total 20 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   Restaurant ID         9551 non-null   int64
 1   Restaurant Name       9550 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              9551 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  Price range           9551 non-null   int64
 15  Aggregate rating      9551 non-null   float64
 16  Rating color          9551 non-null   object
 17  Rating text           9551 non-null   object
 18  Votes                 9551 non-null   int64
 19  Country               9551 non-null   object
dtypes: float64(3), int64(5), object(12)
memory usage: 1.5+ MB
```

[16]:
```
# Group by City and Calculate average cost for two and plot a bar graph for top 5
df.groupby("City")["Average Cost for two"].mean().sort_values(ascending=False).head().plot(kind='bar')
plt.title("Average cost for two in top 5 Cities")
plt.ylabel("Amount")
plt.show()
```



[17]:
```
#Cuisines having High votes
df1=df.groupby("Cuisines")["Votes"].sum().reset_index()
df1
```

[17]:

	Cuisines	Votes
0	Afghani	39
1	Afghani, Mughlai, Chinese	2
2	Afghani, North Indian	0
3	Afghani, North Indian, Pakistani, Arabian	3
4	African	373
…	…	…
1821	Western, Asian, Cafe	259
1822	Western, Fusion, Fast Food	32
1823	World Cuisine	95
1824	World Cuisine, Mexican, Italian	115
1825	World Cuisine, Patisserie, Cafe	1034

[1826 rows x 2 columns]

[23]:
```
df1[df1["Votes"] != 0]
```

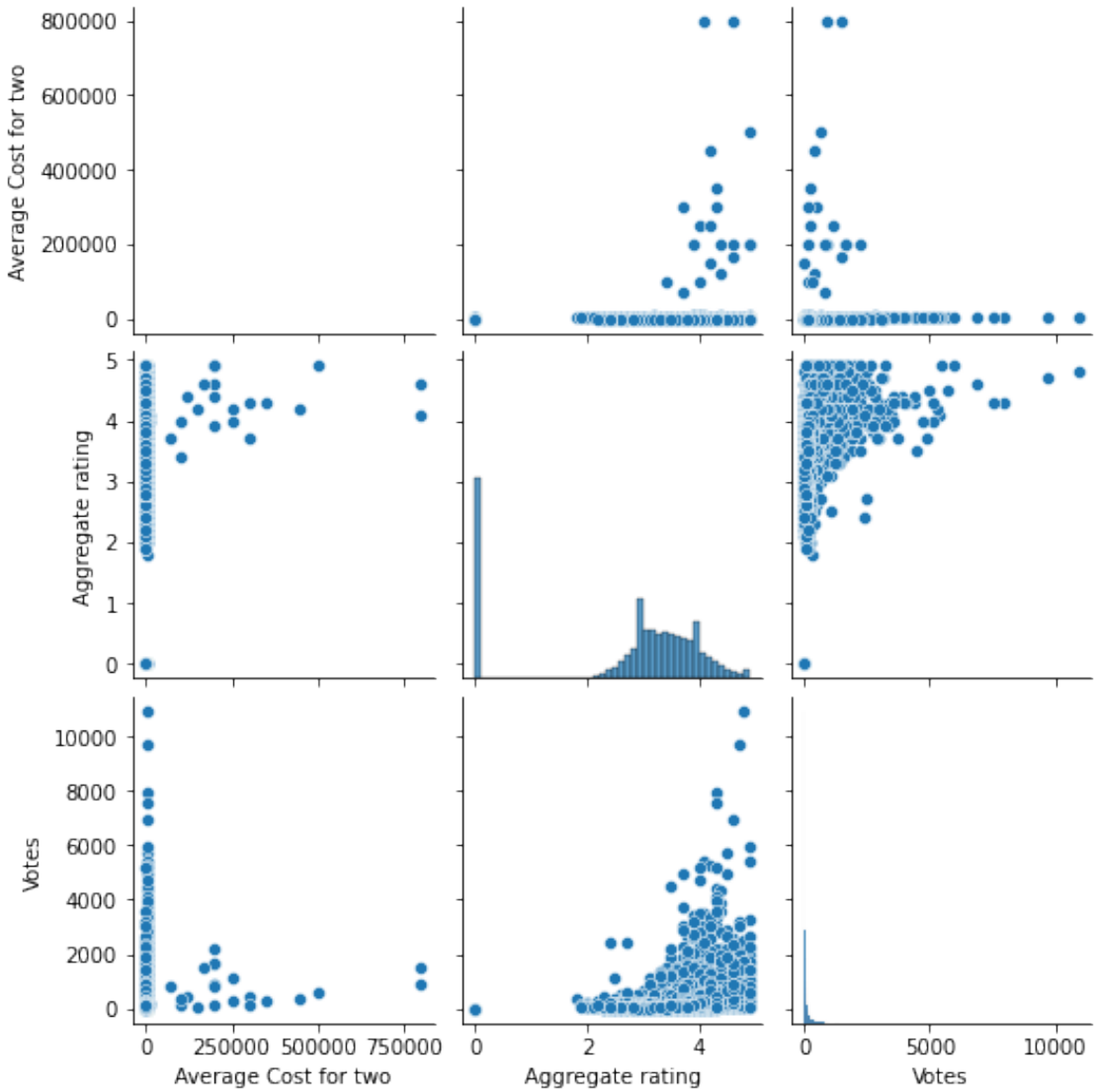
[23]:

	Cuisines	Votes
0	Afghani	39
1	Afghani, Mughlai, Chinese	2
3	Afghani, North Indian, Pakistani, Arabian	3
4	African	373
5	African, Portuguese	265
…	…	…
1821	Western, Asian, Cafe	259
1822	Western, Fusion, Fast Food	32
1823	World Cuisine	95
1824	World Cuisine, Mexican, Italian	115
1825	World Cuisine, Patisserie, Cafe	1034

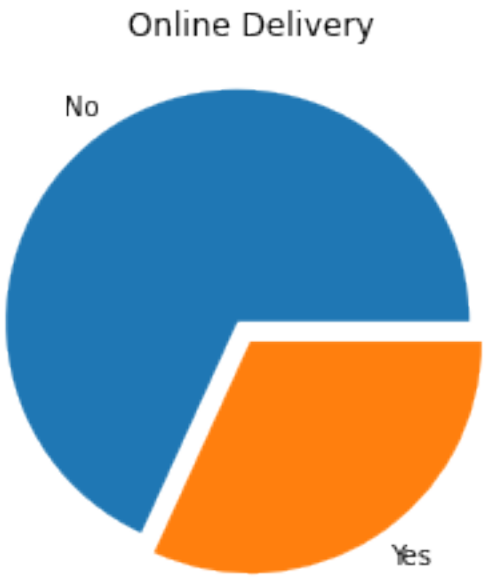
[1778 rows x 2 columns]

[25]:
```
# Comparision between Average cost of two, Aggregate rating and Votes
sns.pairplot(df[["Average Cost for two","Aggregate rating","Votes"]])
```

[25]:
```
<seaborn.axisgrid.PairGrid at 0x7f320e5c0b80>
```



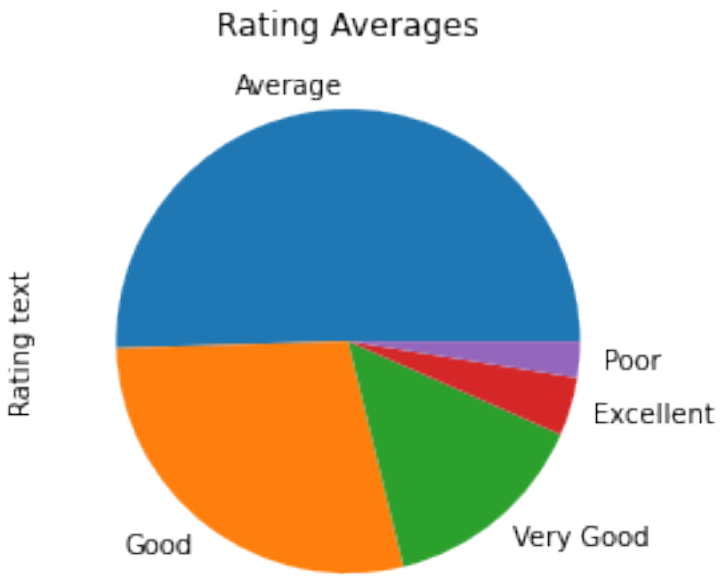
[62]:
```
# To check number of restaurants with Online Delivery
df["Has Online delivery"].value_counts().plot(kind="pie",explode=(0.1,0))
plt.title("Online Delivery")
plt.ylabel("")
plt.show()
```



[27]:
```
# To check for Rating Counts
df["Rating text"].value_counts()
```

[27]:
```
Average      3737
Not rated    2148
Good         2100
Very Good    1079
Excellent     301
Poor          186
Name: Rating text, dtype: int64
```

[28]:
```
# To filter out not rated ones
df=df[df["Rating text"] != "Not rated"]
df["Rating text"].value_counts().plot(kind="pie")
plt.title("Rating Averages")
plt.show()
```

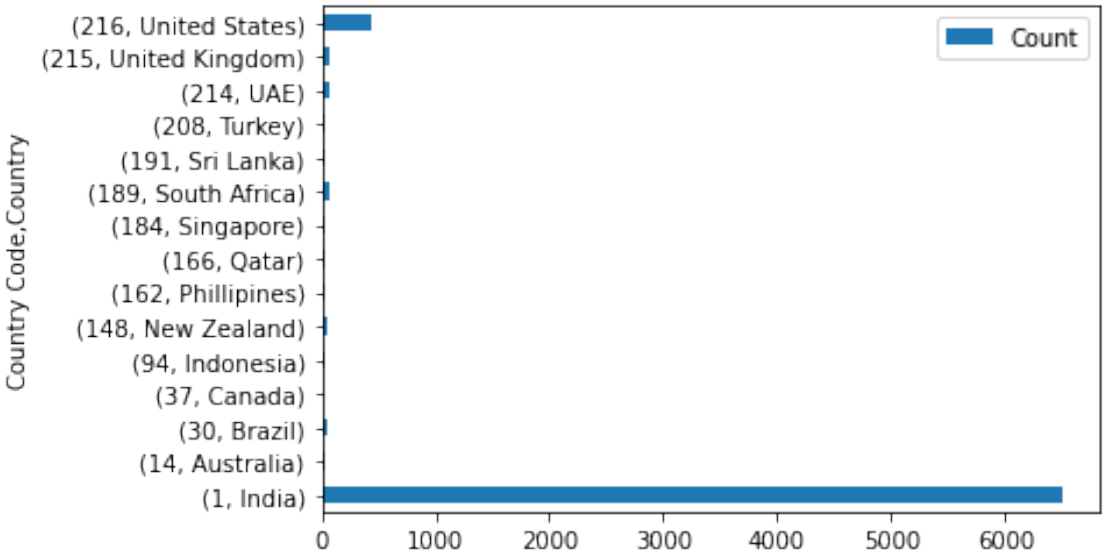


[53]:
```
#Explore the geographical distribution of the restaurants.
dist = df.groupby(['Country Code','Country']).agg( Count = ('Restaurant␣
 ↪ID','count'))
dist.sort_values(by='Count',ascending=False)
#We observe that India has then highest number of restaurants with 8651␣
 ↪restaurants and USA is number 2 with 434 restaurants
```

[53]:

Country Code	Country	Count
1	India	6513
216	United States	431
215	United Kingdom	79
189	South Africa	60
214	UAE	60
30	Brazil	55
148	New Zealand	40
208	Turkey	34
14	Australia	24
162	Phillipines	22
94	Indonesia	21
166	Qatar	20
184	Singapore	20
191	Sri Lanka	20
37	Canada	4

[55]:
```
dist.plot(kind='barh')
plt.show()
```



[56]:
```
#Finding out the cities with maximum / minimum number of restaurants
city = df.groupby(['Country','City']).agg(Count = ('Restaurant ID','count'))
city.describe()
#city with max restaurant has count = 4048
#city with min restaurant has count = 1
```

[56]:

	Count
count	141.000000
mean	52.503546
std	351.806697
min	1.000000
25%	1.000000
50%	20.000000
75%	20.000000
max	4048.000000

[57]:
```
city.sort_values(by='Count',ascending=False)
# we see that new Delhi has the maximum restaurant with 5473
# we observe that multiple cities have only one restaurant.
```

[57]:

		Count
Country	City	
India	New Delhi	4048
	Gurgaon	890
	Noida	696

```
                Faridabad         151
                Ghaziabad          23
…                                  …
                Panchkula           1
Australia       Balingup            1
Indonesia       Bandung             1
Phillipines     Quezon City         1
United States   Winchester Bay      1

[141 rows x 1 columns]
```

[58]:
```
min_cnt = city[city['Count']==1]
min_cnt.info()
min_cnt
#There are 46 cities in 7 different countries with 1 restaurants
```

```
<class 'pandas.core.frame.DataFrame'>
MultiIndex: 46 entries, ('Australia', 'Armidale') to ('United States',
'Winchester Bay')
Data columns (total 1 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Count   46 non-null     int64
dtypes: int64(1)
memory usage: 1.8+ KB
```

[58]:

Country	City	Count
Australia	Armidale	1
	Balingup	1
	Beechworth	1
	Dicky Beach	1
	East Ballina	1
	Flaxton	1
	Forrest	1
	Huskisson	1
	Inverloch	1
	Lakes Entrance	1
	Lorn	1
	Macedon	1
	Mayfield	1
	Middleton Beach	1
	Montville	1
	Palm Cove	1
	Paynesville	1
	Penola	1
	Phillip Island	1

```
                Tanunda               1
                Trentham East         1
                Victor Harbor         1
Canada          Chatham-Kent          1
                Consort               1
                Vineland Station      1
                Yorkton               1
India           Mohali                1
                Panchkula             1
Indonesia       Bandung               1
Phillipines     Quezon City           1
                Tagaytay City         1
South Africa    Randburg              1
United States   Clatskanie            1
                Cochrane              1
                Fernley               1
                Lakeview              1
                Lincoln               1
                Mc Millan             1
                Miller                1
                Monroe                1
                Ojo Caliente          1
                Potrero               1
                Princeton             1
                Vernonia              1
                Weirton               1
                Winchester Bay        1
```

[60]:
```
#Explore the franchise with most national presence
franch = df.groupby(['Restaurant Name','Country']).agg(Count =␣
 ↪('Country','count'))
franch.sort_values(by='Count',ascending=False)
#Dominoes Pizza has most national prsesence
```

[60]:

Restaurant Name	Country	Count
Domino's Pizza	India	74
Cafe Coffee Day	India	67
Subway	India	61
McDonald's	India	47
Green Chick Chop	India	44
…		…
Giuseppe's Pizza & Italian Specialities	United States	1
Giulios Greek & Italian Restaurant	United States	1
Giri Momos Centre & Chinese Fast Food	India	1
Giri Manja's	India	1
Ìàukura€Ùa Sofras€±	Turkey	1

```
[5736 rows x 1 columns]
```

[65]:
```
df1=df.copy()
```

[66]:
```
dummy = ['Has Table booking','Has Online delivery']
df1 = pd.get_dummies(df1,columns=dummy,drop_first=True)
df1.head()
# 0 indicates 'NO'
# 1 indicates 'YES'
```

[66]:

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitude	Latitude	Cuisines	Average Cost for two	Currency	Price range	Aggregate rating	Rating color	Rating text	Votes	Country	Has Table booking_Yes
0	7402935	Skye	94	Jakarta	Menara BCA, Lantai 56, Jl. MH. Thamrin, Thamri…	Grand Indonesia Mall, Thamrin	Grand Indonesia Mall, Thamrin, Jakarta	106.821999	-6.196778	Italian, Continental	800000	Indonesian Rupiah(IDR)	3	4.1	Green				
1	7410290	Satoo - Hotel Shangri-La	94	Jakarta	Hotel Shangri-La, Jl. Jend. Sudirman	Hotel Shangri-La, Sudirman	Hotel Shangri-La, Sudirman, Jakarta	106.818961	-6.203292	Asian, Indonesian, Western	800000	Indonesian Rupiah(IDR)	3	4.6	Dark Green				
2	7420899	Sushi Masa	94	Jakarta	Jl. Tuna Raya No. 5, Penjaringan	Penjaringan	Penjaringan, Jakarta	106.800144	-6.101298	Sushi, Japanese	500000	Indonesian Rupiah(IDR)	3	4.9	Dark Green				
3	7421967	3 Wise Monkeys	94	Jakarta	Jl. Suryo No. 26, Senopati, Jakarta	Senopati	Senopati, Jakarta	106.813400	-6.235241	Japanese	450000	Indonesian Rupiah(IDR)	3	4.2	Green				
4	7422489	Avec Moi Restaurant and Bar	94	Jakarta	Gedung PIC, Jl. Teluk Betung 43, Thamrin, Jakarta	Thamrin	Thamrin, Jakarta	106.821023	-6.196270	French, Western	350000	Indonesian Rupiah(IDR)	3	4.3	Green				

```
0   Very Good   1498  Indonesia                      0
1   Excellent    873  Indonesia                      0
2   Excellent    605  Indonesia                      0
3   Very Good    395  Indonesia                      0
4   Very Good    243  Indonesia                      0

   Has Online delivery_Yes
0                        0
1                        0
2                        0
3                        0
4                        0
```

[68]:
```
#Ration between restaurants allowing table booking and those which dont
table_booking = df1[df1['Has Table booking_Yes']==1]['Restaurant ID'].count()
table_nbooking =df1[df1['Has Table booking_Yes']==0]['Restaurant ID'].count()
print('Ratio between restaurants that allow table booking vs. those that do not␣
 ↪allow table booking: ',
      round((table_booking/table_nbooking),2))
```

```
Ratio between restaurants that allow table booking vs. those that do not allow
table booking:  0.18
```

[69]:
```
#Percentage of restaurant that has online delivery
od = df1[df1['Has Online delivery_Yes'] == 1]['Restaurant ID'].count()
nod = df1[df1['Has Online delivery_Yes'] == 0]['Restaurant ID'].count()
print('Percentage of restaurants providing online delivery : {} %'.
 ↪format((round(od/len(df1),3)*100)))
```

```
Percentage of restaurants providing online delivery : 31.8 %
```

[70]:
```
rest_deliver = df1[df1['Has Table booking_Yes'] == 1]['Votes'].sum()
rest_ndeliver = df1[df1['Has Table booking_Yes'] == 0]['Votes'].sum()
print('Difference in number of votes for restaurants that deliver and dont␣
 ↪deliver: ',abs((rest_deliver - rest_ndeliver)))
```

```
Difference in number of votes for restaurants that deliver and dont deliver:
679072
```

[77]:
```
max_rate = df1.sort_values(by='Aggregate rating',ascending=False).
 ↪groupby(['Country','City'],as_index=False).first()
#highest rating restaurants

min_rate = df1.sort_values(by='Aggregate rating',ascending=False).
 ↪groupby(['Country','City'],as_index=False).last()
#lowest rating restaurants
```

```
df_max=max_rate[['Country','City','Restaurant Name','Aggregate rating']] #new␣
 ↪dataframe created for high rated restaurants

df_min=min_rate[['Country','City','Restaurant Name','Aggregate rating']] #new␣
 ↪dataframe created for low rated restaurants

rating_rest=df_max.merge(df_min,left_on='City',right_on='City',how='inner')␣
 ↪#merge into single dataframe

rating_rest.drop(columns='Country_y',axis=1,inplace=True)
rating_rest.columns = ['Country','City','Highest Rated Restaurant','Rating␣
 ↪Max','Lowest Rated Restaurant','Rating Min']
rating_rest
```

[77]:

	Country	City	Highest Rated Restaurant	\
0	Australia	Armidale	Whitebull Hotel	
1	Australia	Balingup	Taste of Balingup	
2	Australia	Beechworth	Bridge Road Brewers	
3	Australia	Dicky Beach	The Giggling Goat	
4	Australia	East Ballina	The Belle General	
..	…	…	…	
136	United States	Valdosta	Smok'n Pig B-B-Q	
137	United States	Vernonia	Blue House Cafe	
138	United States	Waterloo	Tokyo Japanese Steak House	
139	United States	Weirton	Theo Yianni's Authentic Greek Restaurant	
140	United States	Winchester Bay	Fishpatrick's Crabby Cafe	

	Rating Max	Lowest Rated Restaurant	Rating Min
0	3.5	Whitebull Hotel	3.5
1	3.2	Taste of Balingup	3.2
2	4.6	Bridge Road Brewers	4.6
3	3.6	The Giggling Goat	3.6
4	4.1	The Belle General	4.1
..	…	…	…
136	4.1	El Toreo Mexican Restaurant	3.1
137	4.3	Blue House Cafe	4.3
138	3.9	Masala Grill & Coffee House	3.2
139	3.9	Theo Yianni's Authentic Greek Restaurant	3.9
140	3.2	Fishpatrick's Crabby Cafe	3.2

[141 rows x 6 columns]

[78]:
```
#To identify top 10 cuisines served across
cuisines = df1['Cuisines'].apply(lambda x: pd.Series(x.split(',')))
cuisines.columns =␣
 ↪['Cuisine_1','Cuisine_2','Cuisine_3','Cuisine_4','Cuisine_5','Cuisine_6','Cuisine_7','Cuisi
cuisines.tail()
```

[78]:
```
        Cuisine_1      Cuisine_2     Cuisine_3   Cuisine_4 Cuisine_5  \
9546      Chinese   North Indian     Fast Food         NaN       NaN
9547       Indian        Chinese   Continental         NaN       NaN
9548         Cafe    Continental      Desserts   Ice Cream   Italian
9549  Street Food            NaN           NaN         NaN       NaN
9550      Chinese   North Indian           NaN         NaN       NaN

       Cuisine_6 Cuisine_7 Cuisine_8
9546         NaN       NaN       NaN
9547         NaN       NaN       NaN
9548   Beverages       NaN       NaN
9549         NaN       NaN       NaN
9550         NaN       NaN       NaN
```

[79]:
```
df_cuisines = pd.concat([df1,cuisines],axis=1)
df_cuisines.head()
```

[79]:
```
   Restaurant ID              Restaurant Name  Country Code     City  \
0        7402935                         Skye            94  Jakarta
1        7410290     Satoo - Hotel Shangri-La            94  Jakarta
2        7420899                  Sushi Masa             94  Jakarta
3        7421967               3 Wise Monkeys            94  Jakarta
4        7422489  Avec Moi Restaurant and Bar            94  Jakarta

                                          Address  \
0  Menara BCA, Lantai 56, Jl. MH. Thamrin, Thamri…
1              Hotel Shangri-La, Jl. Jend. Sudirman
2                  Jl. Tuna Raya No. 5, Penjaringan
3               Jl. Suryo No. 26, Senopati, Jakarta
4  Gedung PIC, Jl. Teluk Betung 43, Thamrin, Jakarta

                      Locality                       Locality Verbose  \
0  Grand Indonesia Mall, Thamrin  Grand Indonesia Mall, Thamrin, Jakarta
1     Hotel Shangri-La, Sudirman     Hotel Shangri-La, Sudirman, Jakarta
2                    Penjaringan                    Penjaringan, Jakarta
3                       Senopati                       Senopati, Jakarta
4                        Thamrin                        Thamrin, Jakarta

    Longitude  Latitude                    Cuisines  …  \
0  106.821999 -6.196778         Italian, Continental  …
1  106.818961 -6.203292  Asian, Indonesian, Western  …
2  106.800144 -6.101298             Sushi, Japanese  …
3  106.813400 -6.235241                    Japanese  …
4  106.821023 -6.196270             French, Western  …

   Has Table booking_Yes Has Online delivery_Yes  Cuisine_1     Cuisine_2  \
0                      0                       0    Italian   Continental
```

```
1                    0                    0      Asian    Indonesian
2                    0                    0      Sushi      Japanese
3                    0                    0   Japanese           NaN
4                    0                    0     French       Western

  Cuisine_3 Cuisine_4  Cuisine_5 Cuisine_6  Cuisine_7  Cuisine_8
0       NaN       NaN        NaN       NaN        NaN        NaN
1   Western       NaN        NaN       NaN        NaN        NaN
2       NaN       NaN        NaN       NaN        NaN        NaN
3       NaN       NaN        NaN       NaN        NaN        NaN
4       NaN       NaN        NaN       NaN        NaN        NaN

[5 rows x 28 columns]
```

[82]:
```
cuisine_loc = pd.DataFrame(df_cuisines[['Country','City','Locality Verbose','Cuisine_1','Cuisine_2','Cuisine_3','Cuisine_4','Cuisine_5','Cuisine_6','Cuisine_7
cuisine_loc_stack=pd.DataFrame(cuisine_loc.stack()) #stacking the columns
cuisine_loc.head()
```

[82]:
```
     Country     City                        Locality Verbose Cuisine_1  \
0  Indonesia  Jakarta  Grand Indonesia Mall, Thamrin, Jakarta   Italian
1  Indonesia  Jakarta     Hotel Shangri-La, Sudirman, Jakarta     Asian
2  Indonesia  Jakarta                    Penjaringan, Jakarta     Sushi
3  Indonesia  Jakarta                       Senopati, Jakarta  Japanese
4  Indonesia  Jakarta                        Thamrin, Jakarta    French

      Cuisine_2 Cuisine_3 Cuisine_4 Cuisine_5 Cuisine_6 Cuisine_7 Cuisine_8
0   Continental       NaN       NaN       NaN       NaN       NaN       NaN
1    Indonesian   Western       NaN       NaN       NaN       NaN       NaN
2      Japanese       NaN       NaN       NaN       NaN       NaN       NaN
3           NaN       NaN       NaN       NaN       NaN       NaN       NaN
4       Western       NaN       NaN       NaN       NaN       NaN       NaN
```

[83]:
```
keys = [c for c in cuisine_loc  if c.startswith('Cuisine')]
a=pd.melt(cuisine_loc, id_vars='Locality Verbose', value_vars=keys,value_name='Cuisines')
#melting the stack into one row
max_rate=pd.DataFrame(a.groupby(by=['Locality Verbose','variable','Cuisines']).size().reset_index())
#find the highest restuarant in the city
max_rate
del max_rate['variable']
max_rate.columns=['Locality Verbose','Cuisines','Count']
max_rate.head()
```

[83]:
```
                                Locality Verbose      Cuisines  Count
0      ILD Trade Centre Mall, Sohna Road, Gurgaon          Cafe      1
```

```
1      ILD Trade Centre Mall, Sohna Road, Gurgaon  North Indian      1
2      ILD Trade Centre Mall, Sohna Road, Gurgaon     Beverages      1
3      ILD Trade Centre Mall, Sohna Road, Gurgaon       Mughlai      1
4  12th Square Building, Banjara Hills, Hyderabad       Mughlai      1
```

[84]:
```
#find the highest restuarant in the city
loc=max_rate.sort_values('Count', ascending=False).groupby(by=['Locality
 ↪Verbose'],as_index=False).first()
loc.head()
```

[84]:
```
                                    Locality Verbose    Cuisines  Count
0         ILD Trade Centre Mall, Sohna Road, Gurgaon        Cafe      1
1     12th Square Building, Banjara Hills, Hyderabad     Chinese      1
2                     A Hotel, Gurdev Nagar, Ludhiana   Fast Food      1
3                ARSS Mall, Paschim Vihar, New Delhi   Fast Food      1
4  Abu Dhabi Mall, Tourist Club Area  (Al Zahiyah…    American      2
```

[87]:
```
rating_res=loc.merge(df1,left_on='Locality Verbose',right_on='Locality
 ↪Verbose',how='inner')
#inner join to merge the two dataframe
df=pd.DataFrame(rating_res[['Country','City','Locality
 ↪Verbose','Cuisines_x','Count']])
#making a dataframe of rating restaurant
country=rating_res.sort_values('Count', ascending=False).
 ↪groupby(by=['Country'],as_index=False).first()
#grouping the data by country code
con=pd.DataFrame(country[['Country','City','Locality','Cuisines_x','Count']])
con.columns=['Country','City','Locality','Cuisines','Number of restaurants in
 ↪the country']
#renaming the columns
con1=con.sort_values('Number of restaurants in the country', ascending=False)
#sorting the restaurants on the basis of the number of restaurants in the
 ↪country
con1[:10]
finalcount=con1.drop(con1.index[[7,10]])
finalcount
```

[87]:
```
          Country             City                     Locality  \
3           India        New Delhi               Connaught Place
14  United States          Dubuque                      Dubuque
5     New Zealand  Wellington City                       Te Aro
1          Brazil   Rio de Janeiro                      Ipanema
6     Phillipines       Pasig City                     Kapitolyo
8       Singapore        Singapore  Marina Centre, Downtown Core
9    South Africa        Cape Town                   Green Point
11         Turkey           Ankara              Gazi Osman PaÅÙa
12            UAE          Sharjah                     Al Mareija
```

```
0       Australia    Trentham East                  Trentham East
2          Canada          Yorkton                       Yorkton
4       Indonesia          Jakarta                       Thamrin
7           Qatar             Doha                 Umm Ghuwailina

         Cuisines  Number of restaurants in the country
3    North Indian                                    47
14       American                                     9
5            Cafe                                     5
1       Brazilian                                     3
6        Filipino                                     2
8         Seafood                                     2
9           Grill                                     2
11  World Cuisine                                     2
12      Pakistani                                     2
0      Australian                                     1
2           Asian                                     1
4         Western                                     1
7          Indian                                     1
```

[89]:
```
rest_cuisine = pd.DataFrame(df_cuisines[['Restaurant␣
 ↪Name','City','Cuisine_1','Cuisine_2','Cuisine_3','Cuisine_4',
                                        ␣
 ↪'Cuisine_5','Cuisine_6','Cuisine_7','Cuisine_8']])
rest_cuisine_stack=pd.DataFrame(rest_cuisine.stack()) #stacking the columns
rest_cuisine.head()
```

[89]:
```
               Restaurant Name     City Cuisine_1     Cuisine_2 Cuisine_3  \
0                         Skye  Jakarta   Italian   Continental       NaN
1     Satoo - Hotel Shangri-La  Jakarta     Asian     Indonesian   Western
2                   Sushi Masa  Jakarta     Sushi      Japanese       NaN
3               3 Wise Monkeys  Jakarta  Japanese           NaN       NaN
4  Avec Moi Restaurant and Bar  Jakarta    French       Western       NaN

  Cuisine_4 Cuisine_5 Cuisine_6 Cuisine_7 Cuisine_8
0       NaN       NaN       NaN       NaN       NaN
1       NaN       NaN       NaN       NaN       NaN
2       NaN       NaN       NaN       NaN       NaN
3       NaN       NaN       NaN       NaN       NaN
4       NaN       NaN       NaN       NaN       NaN
```

[90]:
```
keys1 = [c for c in rest_cuisine  if c.startswith('Cuisine')]
b=pd.melt(rest_cuisine, id_vars='Restaurant Name', value_vars=keys,␣
 ↪value_name='Cuisines')
#melting the stack into one row
max_rate1=pd.DataFrame(b.groupby(by=['Restaurant Name','variable','Cuisines']).
 ↪size().reset_index())
```

```
#find the highest restuarant in the city
max_rate1
del max_rate1['variable']
max_rate1.columns=['Restaurant_Name','Cuisines','Count']
max_rate1.head(20)
```

[90]:

	Restaurant_Name	Cuisines	Count
0	12212	Fast Food	1
1	#45	Cafe	1
2	#Dilliwaala6	North Indian	1
3	#OFF Campus	Cafe	1
4	#OFF Campus	Continental	1
5	#OFF Campus	Italian	1
6	#OFF Campus	Fast Food	1
7	#Urban CafÌ©	North Indian	1
8	#Urban CafÌ©	Chinese	1
9	#Urban CafÌ©	Italian	1
10	'Ohana	Hawaiian	1
11	10 Downing Street	North Indian	2
12	10 Downing Street	Chinese	2
13	10 To 10 In Delhi	Indian	1
14	10 To 10 In Delhi	Cafe	1
15	11th Avenue Cafe Bistro	Cafe	1
16	11th Avenue Cafe Bistro	American	1
17	11th Avenue Cafe Bistro	Italian	1
18	11th Avenue Cafe Bistro	Continental	1
19	145 Kala Ghoda	Fast Food	1

[91]:
```
max_rate1.sort_values('Count',ascending=False)
#Dominoes Pizza has the max number of cuisines and The least number of cuisines␣
 ↪in a resaurant is 1
```

[91]:

	Restaurant_Name	Cuisines	Count
3690	Domino's Pizza	Pizza	74
3691	Domino's Pizza	Fast Food	73
1995	Cafe Coffee Day	Cafe	67
10493	Subway	Salad	61
10494	Subway	Healthy Food	61
…	…	…	…
4546	Gemelli Cucina Bar	Contemporary	1
4547	Gemelli Cucina Bar	Italian	1
4548	GenY Cuisines	Chinese	1
4549	GenY Cuisines	Mexican	1
13044	Ìàukura€Ùa Sofras€±	Izgara	1

[13045 rows x 3 columns]

[96]:
```
rating = df1[['Restaurant ID','Restaurant Name','Country','City','Aggregate␣
 ↪rating','Average Cost for two','Votes','Price range','Has Table␣
 ↪booking_Yes','Has Online delivery_Yes']]
rating = rating.merge(max_rate1,left_on='Restaurant␣
 ↪Name',right_on='Restaurant_Name',how='left')
rating
```

[96]:

	Restaurant ID	Restaurant Name	Country	City	\
0	7402935	Skye	Indonesia	Jakarta	
1	7402935	Skye	Indonesia	Jakarta	
2	7410290	Satoo - Hotel Shangri-La	Indonesia	Jakarta	
3	7410290	Satoo - Hotel Shangri-La	Indonesia	Jakarta	
4	7410290	Satoo - Hotel Shangri-La	Indonesia	Jakarta	
…	…	…	…	…	
19275	18312106	UrbanCrave	India	Kanpur	
19276	18312106	UrbanCrave	India	Kanpur	
19277	3900245	Deena Chat Bhandar	India	Varanasi	
19278	18246202	VNS Live Studio	India	Varanasi	
19279	18246202	VNS Live Studio	India	Varanasi	

	Aggregate rating	Average Cost for two	Votes	Price range	\
0	4.1	800000	1498	3	
1	4.1	800000	1498	3	
2	4.6	800000	873	3	
3	4.6	800000	873	3	
4	4.6	800000	873	3	
…	…	…	…	…	
19275	3.9	0	127	1	
19276	3.9	0	127	1	
19277	3.8	0	78	1	
19278	3.5	0	109	1	
19279	3.5	0	109	1	

	Has Table booking_Yes	Has Online delivery_Yes	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	
…	…	…	
19275	0	0	
19276	0	0	
19277	0	0	
19278	0	0	
19279	0	0	

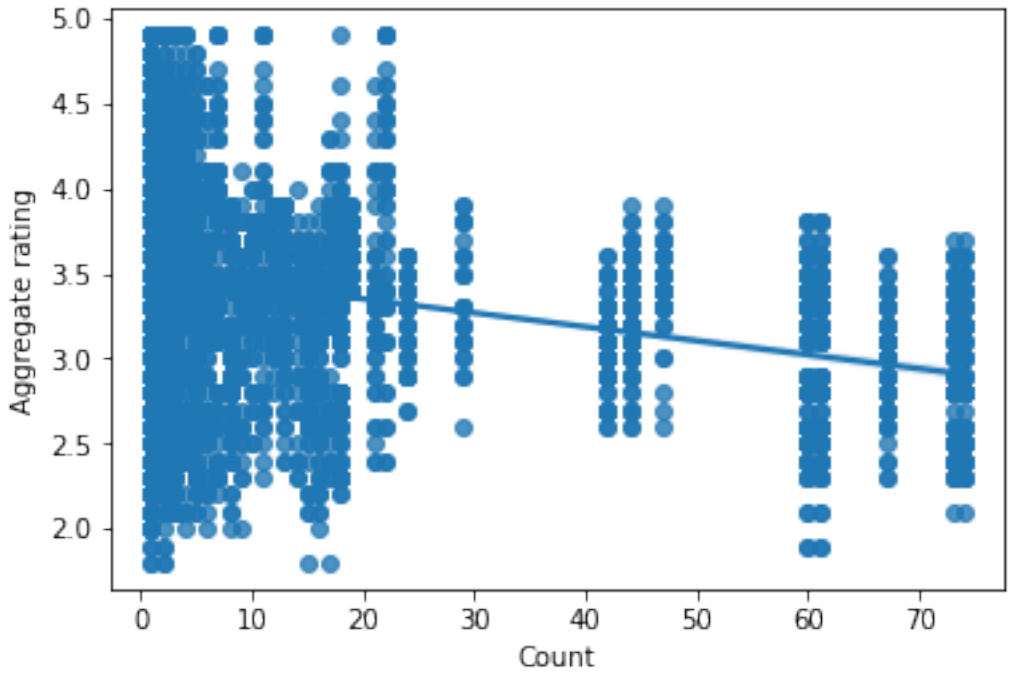
	Restaurant_Name	Cuisines	Count

```
0                          Skye        Italian    1.0
1                          Skye    Continental    1.0
2       Satoo - Hotel Shangri-La          Asian    1.0
3       Satoo - Hotel Shangri-La     Indonesian    1.0
4       Satoo - Hotel Shangri-La        Western    1.0
…                            …            …    …
19275                UrbanCrave        Italian    1.0
19276                UrbanCrave      Beverages    1.0
19277         Deena Chat Bhandar    Street Food    1.0
19278            VNS Live Studio        Chinese    1.0
19279            VNS Live Studio   North Indian    1.0

[19280 rows x 13 columns]
```

[98]:
```
sns.regplot(x='Count',y='Aggregate rating',data=rating)
rating[["Count", "Aggregate rating"]].corr()
#Number of cuisines is not a good factor to decide the rating of a restaurant
```

[98]:
```
                     Count  Aggregate rating
Count              1.00000          -0.15956
Aggregate rating -0.15956           1.00000
```

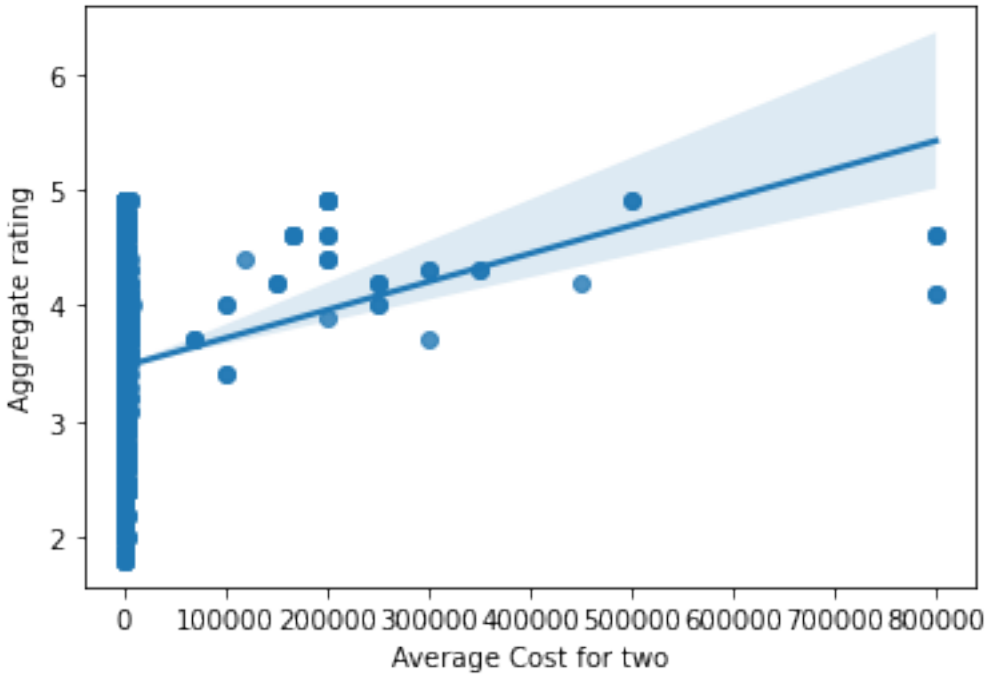


[100]:
```
sns.regplot(x='Average Cost for two',y='Aggregate rating',data=rating)
rating[["Average Cost for two", "Aggregate rating"]].corr()
```

```
#Average cost for two is a weak positive factor to decide the rating of a␣
↪restaurant
```

[100]:

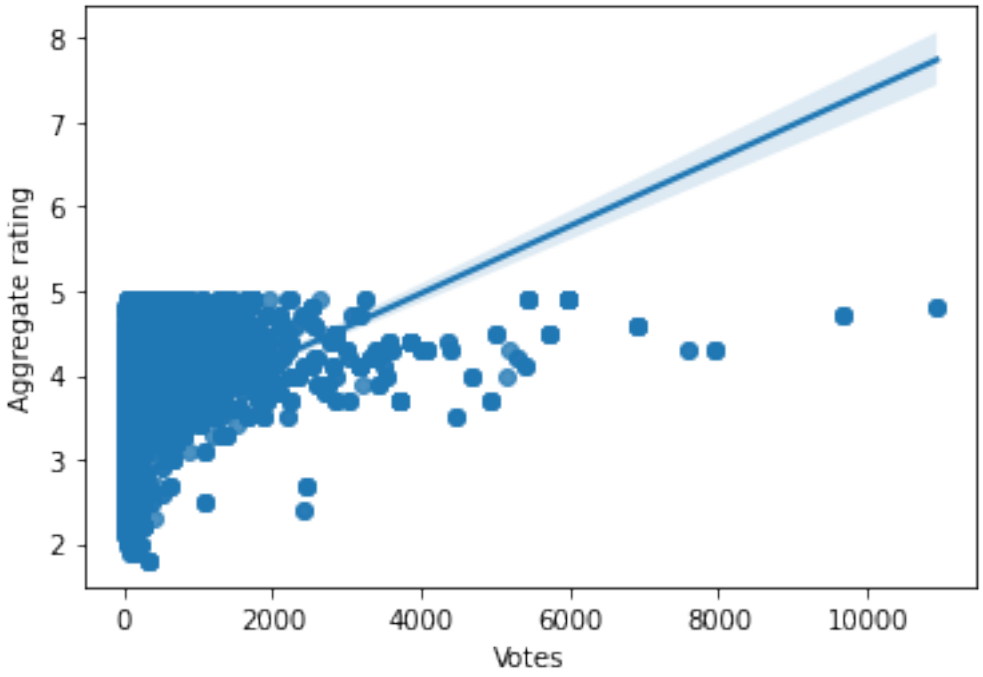
	Average Cost for two	Aggregate rating
Average Cost for two	1.000000	0.071343
Aggregate rating	0.071343	1.000000



[101]:
```
sns.regplot(x='Votes',y='Aggregate rating',data=rating)
rating[['Votes','Aggregate rating']].corr()
##Average cost for two can be a factor to decide the rating of a restaurant
```

[101]:

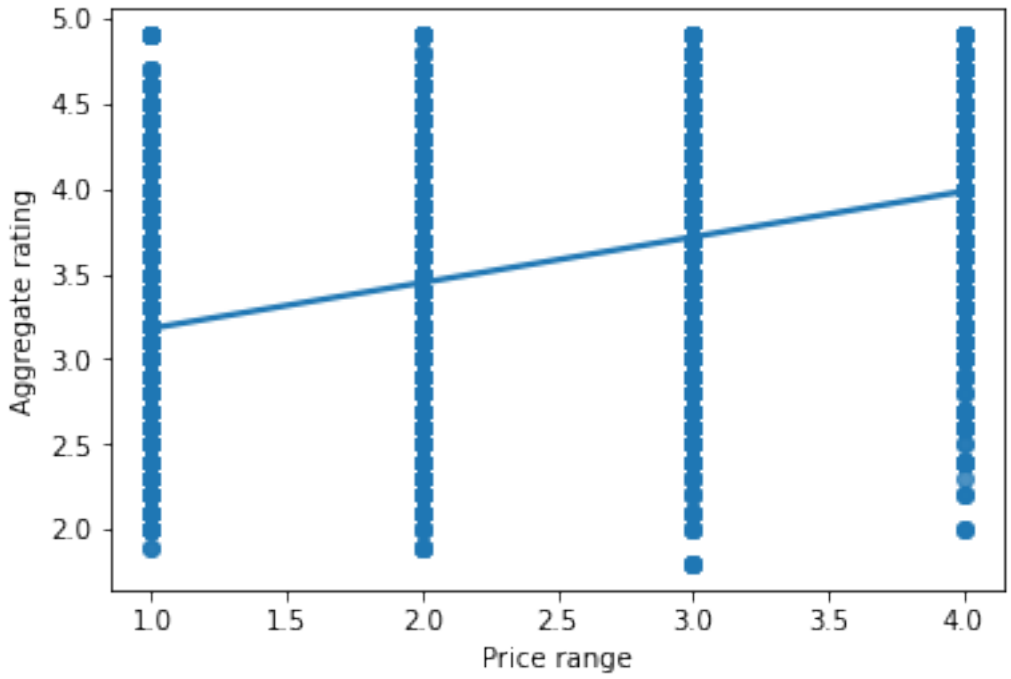
	Votes	Aggregate rating
Votes	1.000000	0.416755
Aggregate rating	0.416755	1.000000



[103]:
```
abc = df1[df1['Has Online delivery_Yes'] == 1]['Aggregate rating'].mean()
xyz = df1[df1['Has Online delivery_Yes'] == 0]['Aggregate rating'].mean()
sns.regplot(x='Price range',y='Aggregate rating',data=rating)
rating[['Price range','Aggregate rating']].corr()
##Price range can be a factor to decide the rating of a restaurant
```

[103]:

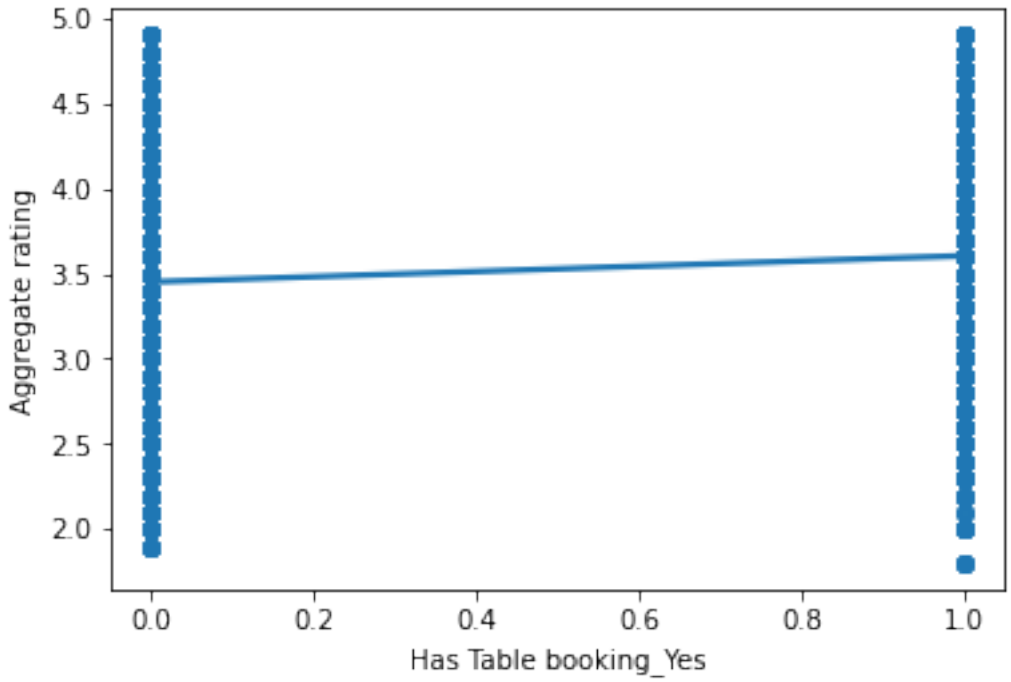
	Price range	Aggregate rating
Price range	1.000000	0.430882
Aggregate rating	0.430882	1.000000



[104]:
```
sns.regplot(x='Has Table booking_Yes',y='Aggregate rating',data=rating)
rating[['Has Table booking_Yes','Aggregate rating']].corr()
##Table booking can be a factor to decide the rating of a restaurant
```

[104]:

	Has Table booking_Yes	Aggregate rating
Has Table booking_Yes	1.000000	0.101398
Aggregate rating	0.101398	1.000000



[39]:
```
x= pd.get_dummies(df[["Average Cost for two", "Has Table booking", "Has Online␣
↪delivery", "Price range"]], drop_first=True)
```

[40]:
```
y=df[["Aggregate rating"]]
```

[41]:
```
x
```

[41]:

	Average Cost for two	Price range	Has Table booking_Yes	Has Online delivery_Yes
0	800000	3	0	0
1	800000	3	0	0
2	500000	3	0	0
3	450000	3	0	0
4	350000	3	0	0
…	…	…	…	
9546	0	1	0	
9547	0	1	0	
9548	0	1	0	
9549	0	1	0	
9550	0	1	0	

```
3                              0
4                              0
…                              …
9546                           0
9547                           0
9548                           0
9549                           0
9550                           0

[7403 rows x 4 columns]
```

[50]:
```python
# Import Necessary libraries
from sklearn.preprocessing import StandardScaler
from sklearn.preprocessing import PolynomialFeatures
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error
```

[51]:
```python
# Standardize the features
scale = StandardScaler()
X_scaled = scale.fit_transform(x)

# Split the data
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2,␣
 ↪random_state=42)

# Train the model
lr = LinearRegression()
lr.fit(X_train, y_train)

# Make predictions
y_pred = lr.predict(X_test)

# Evaluate the model
mse = mean_squared_error(y_test, y_pred)
rmse = np.sqrt(mse)
print(f"Mean Squared Error: {mse}")
print(f"Root Mean Squared Error: {rmse}")
```

```
Mean Squared Error: 0.24463633969361387
Root Mean Squared Error: 0.49460725802763333
```

[ ]: