DA Capston project 1-Identifying and recommending best restaurant

October 1, 2021

[1]:
```
#importing libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import statistics as stc
```

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

[2]:
```
   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
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
```

[3]:
```python
cc = pd.read_excel('Country-Code.xlsx')
```

[4]:
```python
merged = pd.merge(data,cc,on='Country Code',how='left')
merged.head()
```

[4]:
```
   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
```

[5]:

```python
merged.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
```

[6]:
```
merged.isna().sum()
#merged.isnull().sum() #total number of null entries per column
```

[6]:
```
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
```

[7]:
```
#Since the restaurant name is missing, we dropped the record and reset the␣
↪index.
merged.dropna(axis=0,subset=['Restaurant Name'],inplace=True)
```

[8]:
```
merged[merged['Cuisines'].isnull()]
```

[8]:
```
      Restaurant ID                Restaurant Name  Country Code  \
9083       17374552                 Corkscrew Cafe           216
9086       17501439                       Dovetail           216
9094       17059060                      Hillstone           216
9406       17284158               Jimmie's Hot Dogs           216
9494       17142698                Leonard's Bakery           216
9504       17616465         Tybee Island Social Club           216
9533       17284105                   Cookie Shoppe           216
9535       17284211  Pearly's Famous Country Cookng           216
9539       17606621              HI Lite Bar & Lounge           216

             City                                        Address  \
9083  Gainesville               51 W Main St, Dahlonega, GA 30533
9086        Macon                  543 Cherry St, Macon, GA 31201
9094      Orlando  215 South Orlando Avenue, Winter Park, FL 32789
9406       Albany               204 S Jackson St, Albany, GA 31701
```

```
9494  Rest of Hawaii           933 Kapahulu Ave, Honolulu, HI 96816
9504        Savannah         1311 Butler Ave, Tybee Island, GA 31328
9533          Albany              115 N Jackson St, Albany, GA 31701
9535          Albany            814 N Slappey Blvd, Albany, GA 31701
9539          Miller            109 N Broadway Ave, Miller, SD 57362

          Locality         Locality Verbose   Longitude   Latitude Cuisines  \
9083     Dahlonega   Dahlonega, Gainesville  -83.985800  34.531800      NaN
9086         Macon             Macon, Macon  -83.627979  32.836410      NaN
9094   Winter Park     Winter Park, Orlando  -81.365260  28.596682      NaN
9406        Albany            Albany, Albany  -84.153400  31.575100      NaN
9494       Kaimuki  Kaimuki, Rest of Hawaii -157.813432  21.284586      NaN
9504  Tybee Island   Tybee Island, Savannah  -80.848297  31.995810      NaN
9533        Albany            Albany, Albany  -84.154000  31.577200      NaN
9535        Albany            Albany, Albany  -84.175900  31.588200      NaN
9539        Miller            Miller, Miller  -98.989100  44.515800      NaN

      Average Cost for two   Currency Has Table booking Has Online delivery  \
9083                    40  Dollar($)                No                  No
9086                    40  Dollar($)                No                  No
9094                    40  Dollar($)                No                  No
9406                    10  Dollar($)                No                  No
9494                    10  Dollar($)                No                  No
9504                    10  Dollar($)                No                  No
9533                     0  Dollar($)                No                  No
9535                     0  Dollar($)                No                  No
9539                     0  Dollar($)                No                  No

      Price range  Aggregate rating Rating color Rating text  Votes  \
9083            3               3.9       Yellow        Good    209
9086            3               3.8       Yellow        Good    102
9094            3               4.4        Green   Very Good   1158
9406            1               3.9       Yellow        Good    160
9494            1               4.7   Dark Green   Excellent    707
9504            1               3.9       Yellow        Good    309
9533            1               3.4       Orange     Average     34
9535            1               3.4       Orange     Average     36
9539            1               3.4       Orange     Average     11

            Country
9083  United States
9086  United States
9094  United States
9406  United States
9494  United States
9504  United States
9533  United States
```

```
9535   United States
9539   United States
```

[9]:
```
#Since there were only 9 records without cuisines, we have replace the null␣
↪values with Others.
merged['Cuisines'].fillna('Others',inplace=True)
```

[10]:
```
#duplicate data finding
duplicateRowsDF = merged[merged.duplicated()]
print("Duplicate Rows except first occurrence based on all columns are :")
print(duplicateRowsDF)
```

```
Duplicate Rows except first occurrence based on all columns are :
Empty DataFrame
Columns: [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, Price range, Aggregate rating, Rating
color, Rating text, Votes, Country]
Index: []
```

1 EDA-1

Explore the geographical distribution of the restaurants

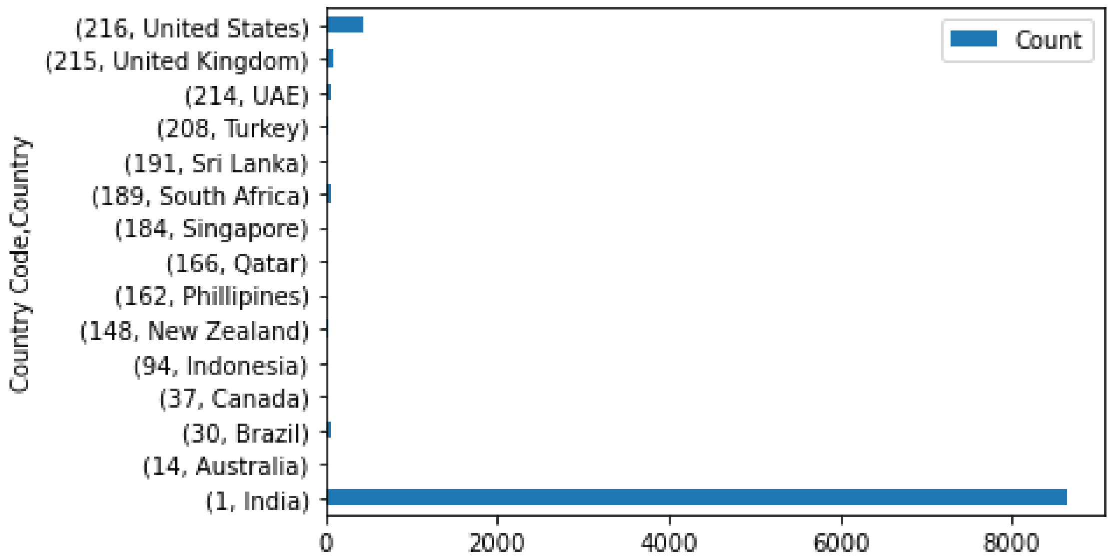
Finding out the cities with maximum / minimum number of restaurants

[11]:
```
country_distri = merged.groupby(['Country Code','Country']).agg( Count =␣
↪('Restaurant ID','count'))
country_distri.sort_values(by='Count',ascending=False)
```

[11]:
```
                            Count
Country Code Country
1            India           8651
216          United States    434
215          United Kingdom    80
30           Brazil            60
189          South Africa      60
214          UAE               60
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
```

[12]:
```python
country_distri.plot(kind='barh')
```

[12]: <AxesSubplot:ylabel='Country Code,Country'>



[13]:
```python
city_dist = merged.groupby(['Country','City']).agg(Count = ('Restaurant␣
↪ID','count'))
city_dist.describe()
```

[13]:

	Count
count	141.000000
mean	67.730496
std	476.723952
min	1.000000
25%	1.000000
50%	20.000000
75%	20.000000
max	5473.000000

[14]:
```python
city_dist.sort_values(by='Count',ascending=False)
# New Delhi has maximum number of restaurant
```

[14]:

Country	City	Count
India	New Delhi	5473
	Gurgaon	1118
	Noida	1080
	Faridabad	251
	Ghaziabad	25

```
…                             …
             Panchkula          1
Australia    Balingup           1
Indonesia    Bandung            1
Phillipines  Quezon City        1
United States Winchester Bay    1

[141 rows x 1 columns]
```

[15]:

```python
# Minimum number of restaurant in following cities
min_cnt_rest = city_dist[city_dist['Count']==1]
min_cnt_rest.info()
min_cnt_rest
```

```
<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
```

[15]:

```
                              Count
Country      City
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
```

[16]:
```python
# Find out the ratio between restaurants that allow table booking vs. those
 ↪that do not allow table booking
merged1 = merged.copy()
merged1.columns
```

[16]:
```
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', 'Price range', 'Aggregate rating',
       'Rating color', 'Rating text', 'Votes', 'Country'],
      dtype='object')
```

[17]:
```python
dummy = ['Has Table booking','Has Online delivery']
merged1 = pd.get_dummies(merged1,columns=dummy,drop_first=True)
merged1.head()
# 0 indicates 'NO'
# 1 indicates 'YES'
```

[17]:
```
   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  Price range  Aggregate rating Rating color  \
0  Indonesian Rupiah(IDR)           3               4.1        Green
1  Indonesian Rupiah(IDR)           3               4.6   Dark Green
2  Indonesian Rupiah(IDR)           3               4.9   Dark Green
3  Indonesian Rupiah(IDR)           3               4.2        Green
4  Indonesian Rupiah(IDR)           3               4.3        Green

  Rating text  Votes    Country  Has Table booking_Yes  \
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
```

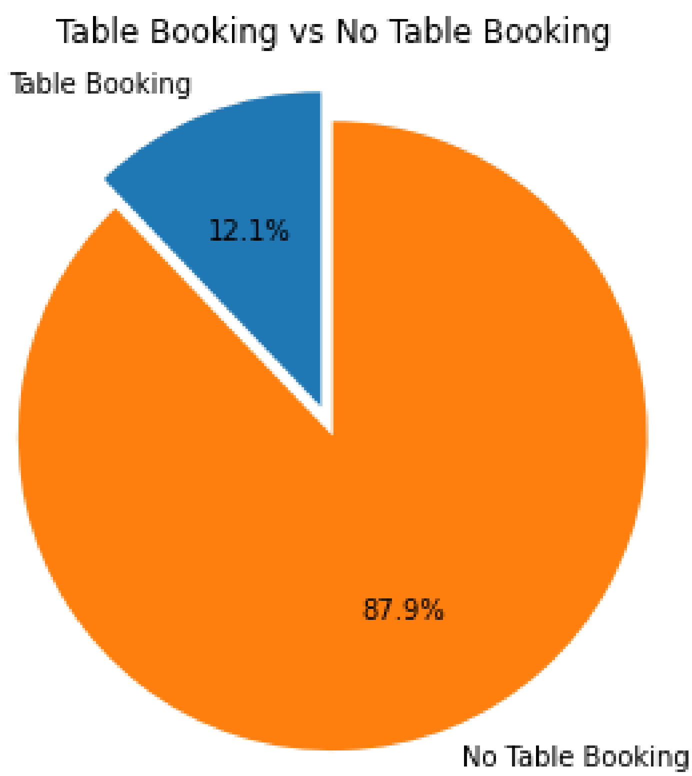
[19]:

```
#Ration between restaurants allowing table booking and those which dont
tbl_book_y = merged1[merged1['Has Table booking_Yes']==1]['Restaurant ID'].
↪count()
tbl_book_n = merged1[merged1['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((tbl_book_y/tbl_book_n),2))
```

```
Ratio between restaurants that allow table booking vs. those that do not allow
table booking:  0.14
```

[20]:

```
#Pie chart to show percentage of restaurants which allow table booking and␣
↪those which don't
labels = 'Table Booking', 'No Table Booking'
sizes = [tbl_book_y,tbl_book_n]
explode = (0.1, 0)  # only "explode" the 2nd slice (i.e. 'Hogs')

fig1, ax1 = plt.subplots(figsize=(5,5))
ax1.pie(sizes, explode=explode, labels=labels, autopct='%1.1f%%', startangle=90)
ax1.set_title("Table Booking vs No Table Booking")
ax1.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.

plt.show()
```



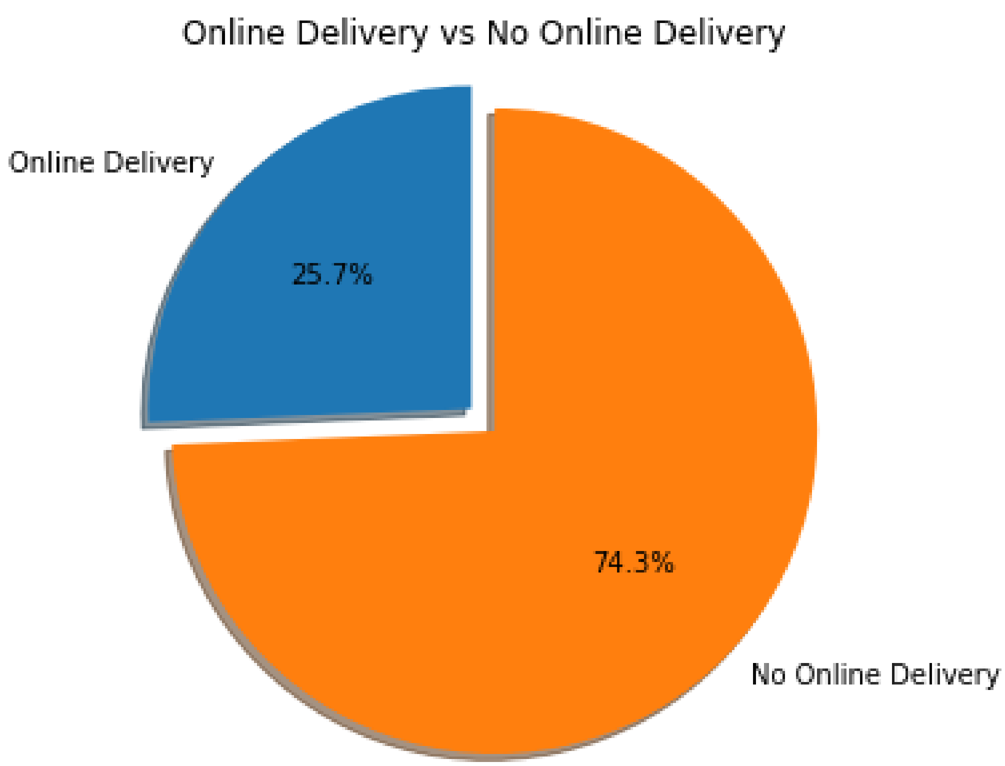
[22]:

```
# Find out the percentage of restaurants providing online delivery
order_on = merged1[merged1['Has Online delivery_Yes'] == 1]['Restaurant ID'].
 ↪count()
order_off = merged1[merged1['Has Online delivery_Yes'] == 0]['Restaurant ID'].
 ↪count()
print('Percentage of restaurants providing online delivery : {} %'.
 ↪format((round(order_on/len(merged1),3)*100)))
```

```
Percentage of restaurants providing online delivery : 25.7 %
```

[22]:

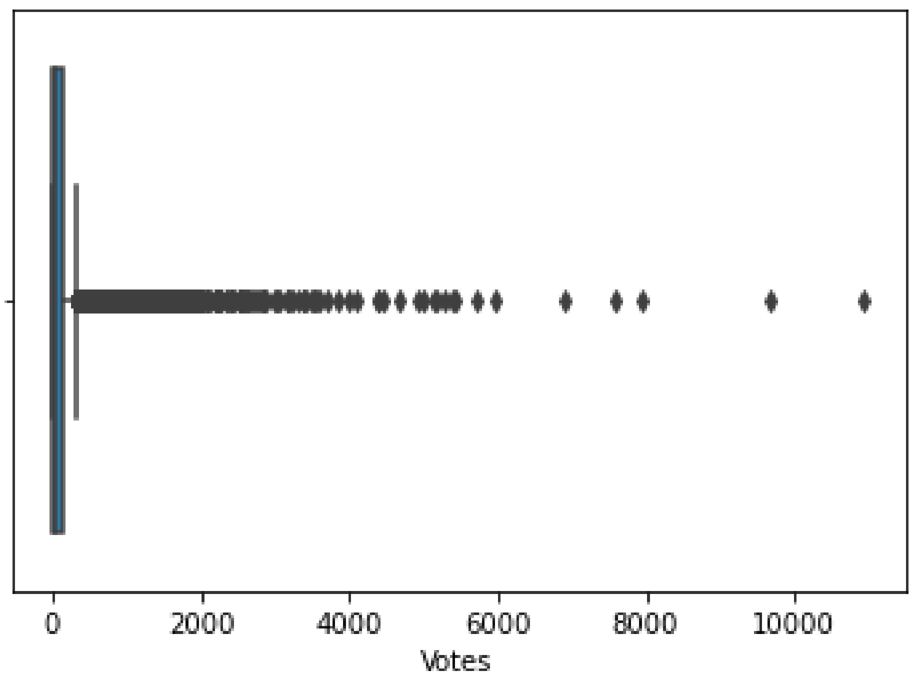
```
#pie chart to show percentages of restaurants allowing online delivery vs those␣
 ↪which do not have online delivery
labels = 'Online Delivery','No Online Delivery'
size = [order_on,order_off]
explode = (0.1,0)
fig1,ax1 = plt.subplots(figsize=(5,5))
ax1.pie(size,explode=explode,labels=labels,autopct='%1.
 ↪1f%%',shadow=True,startangle=90)
ax1.set_title("Online Delivery vs No Online Delivery")
ax1.axis('equal')
plt.show()
```



[23]:
```
sns.boxplot(merged['Votes'])
```

```
C:\Users\HP\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

[23]:
```
<AxesSubplot:xlabel='Votes'>
```



[24]:
```
# Calculate the difference in number of votes for the restaurants that deliver␣
↪and the restaurants that do not deliver
# first detect and remove (replace it with mean/closest possible value) outlier␣
↪for VOTE
import sklearn
import pandas as pd

''' Detection '''
# IQR
Q1 = np.percentile(merged['Votes'], 25,
                   interpolation = 'midpoint')
```

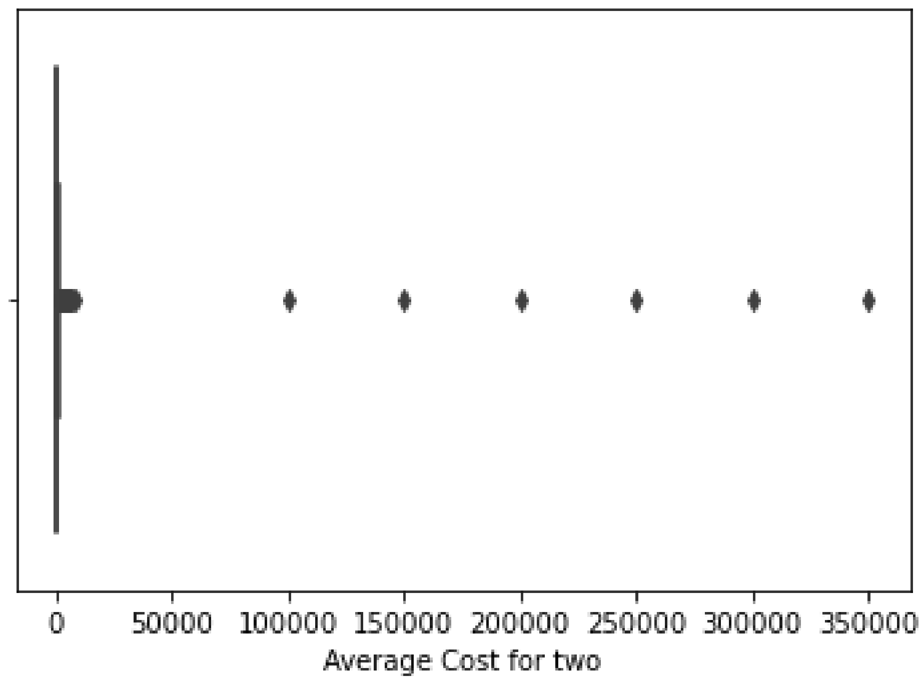
```
Q3 = np.percentile(merged['Votes'], 75,
                   interpolation = 'midpoint')
IQR = Q3 - Q1

print("Old Shape: ", merged.shape)

# Upper bound
upper = np.where(merged['Votes'] >= (Q3+1.5*IQR))
#print("Upper bound:",upper)
#print(np.where(upper))
# Lower bound
lower = np.where(merged['Votes'] <= (Q1-1.5*IQR))

''' Removing the Outliers '''
merged.drop(upper[0], inplace = True)
merged.drop(lower[0], inplace = True)

print("New Shape: ", merged.shape)
```

```
Old Shape:  (9550, 20)
New Shape:  (8423, 20)
```

[65]:
```
sns.boxplot(merged['Average Cost for two'])
```

```
C:\Users\HP\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

[65]:
```
<AxesSubplot:xlabel='Average Cost for two'>
```



[27]:
```
import sklearn
import pandas as pd

''' Detection '''
# IQR
Q1 = np.percentile(merged['Average_Cost_for_two'], 25,
                   interpolation = 'midpoint')

Q3 = np.percentile(merged['Average_Cost_for_two'], 75,
                   interpolation = 'midpoint')
IQR = Q3 - Q1

print("Old Shape: ", merged.shape)

# Upper bound
upper = np.where(merged['Average_Cost_for_two'] >= (Q3+1.5*IQR))
print("Upper bound:",upper)
print(np.where(upper))
# Lower bound
lower = np.where(merged['Average_Cost_for_two'] <= (Q1-1.5*IQR))

''' Removing the Outliers '''
merged.drop(upper[0], inplace = True)
merged.drop(lower[0], inplace = True)
```

```
print("New Shape: ", merged.shape)
```

```
Old Shape:  (8423, 20)
Upper bound: (array([  0,   1,   2,   3,   4,   5,   6,   7,   8,   9,  10,  11,
12,
        13,  14,  15,  16,  17,  18,  19,  20,  21,  22,  23,  24,  25,
        26,  27,  28,  29,  30,  31,  32,  33,  34,  35,  36,  37,  38,
        39,  40,  41,  42,  43,  44,  45,  46,  47,  48,  49,  50,  51,
        52,  53,  54,  55,  56,  57,  58,  59,  60,  61,  62,  63,  64,
        65,  66,  67,  68,  69,  70,  71,  72,  73,  74,  75,  76,  77,
        78,  79,  80,  81,  82,  83,  84,  85,  86,  87,  88,  89,  90,
        91,  92,  93,  94,  95,  96,  97,  98,  99, 100, 101, 102, 103,
       104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116,
       117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129,
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664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676,
677], dtype=int64))
```
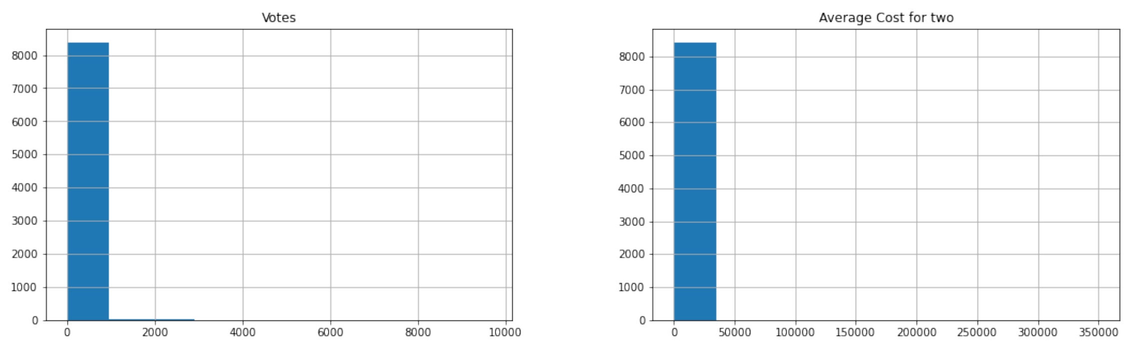

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
<ipython-input-27-6da19423259a> in <module>
     21
     22 ''' Removing the Outliers '''
---> 23 merged.drop(upper[0], inplace = True)
     24 merged.drop(lower[0], inplace = True)
     25

~\anaconda3\lib\site-packages\pandas\core\frame.py in drop(self, labels, axis,␣
 ↪index, columns, level, inplace, errors)
   4306                 weight  1.0     0.8
   4307         """
-> 4308         return super().drop(
   4309             labels=labels,
   4310             axis=axis,

~\anaconda3\lib\site-packages\pandas\core\generic.py in drop(self, labels, axis␣
 ↪index, columns, level, inplace, errors)
   4151         for axis, labels in axes.items():
   4152             if labels is not None:
-> 4153                 obj = obj._drop_axis(labels, axis, level=level,␣
 ↪errors=errors)
   4154
   4155         if inplace:

~\anaconda3\lib\site-packages\pandas\core\generic.py in _drop_axis(self, labels␣
 ↪axis, level, errors)
   4186                 new_axis = axis.drop(labels, level=level, errors=errors
   4187             else:
-> 4188                 new_axis = axis.drop(labels, errors=errors)
   4189             result = self.reindex(**{axis_name: new_axis})
   4190

~\anaconda3\lib\site-packages\pandas\core\indexes\base.py in drop(self, labels,
 ↪errors)
   5589         if mask.any():
   5590             if errors != "ignore":
-> 5591                 raise KeyError(f"{labels[mask]} not found in axis")
   5592             indexer = indexer[~mask]
   5593         return self.delete(indexer)
```

```
KeyError: '[  0    1    2    3    5    7    9   11   12   13   14   15   17   19   20   23   24
↪30\n  31  34  40  43  47  48  52  56  57  60  67  76  85  97  99 104 108 111\
↪112 120 131 135 145 153 154 160 161 165 166 176 177 178 189 197 198 205\n 209
↪211 212 213 218 219 220 221 223 224 229 230 231 232 233 237 239 247\n 249 250
↪254 256 257 258 259 261 262 263 264 265 266 267 268 269 270 271\n 275 280 282
↪284 288 290 294 295 296 297 300 307 314 315 316 318 319 321\n 324 332 336 358
↪361 362 369 372 373 374 376 379 380 381 382 388 389 390\n 392 396 404 406 407
↪408 409 410 411 412 418 419 420 421 422 423 426 432\n 433 434 436 437 438 440
↪443 447 448 449 451 453 454 455 457 458 460 463\n 470 471 472 476 477 478 479
↪480 482 485 486 489 492 494 496 497 499 501\n 504 511 513 514 518 519 520 521
↪522 531 532 533 534 535 536 537 538 539\n 540 542 543 546 547 549 550 551 552
↪553 555 557 558 561 562 563 566 567\n 569 570 572 573 576 578 579 580 582 583
↪584 586 589 590 591 592 593 601\n 602 603 608 609 610 611 613 615 623 631 632
↪633 634 635 639 643 644 647\n 648 649 651 657 658 663 664 665 666 667 672 674
↪not found in axis'
```

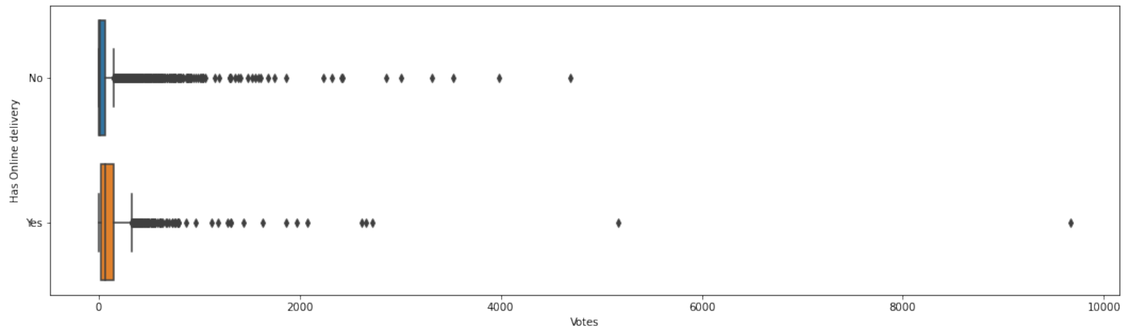
[27]:
```python
merged.hist(['Votes', 'Average Cost for two'], figsize=(18,5))
```

[27]:
```
array([[<AxesSubplot:title={'center':'Votes'}>,
        <AxesSubplot:title={'center':'Average Cost for two'}>]],
      dtype=object)
```



[28]:
```python
dimen=(18,5)
fig, ax = plt.subplots(figsize=dimen)
sns.boxplot(x='Votes',y='Has Online delivery',data=merged,ax=ax)
```

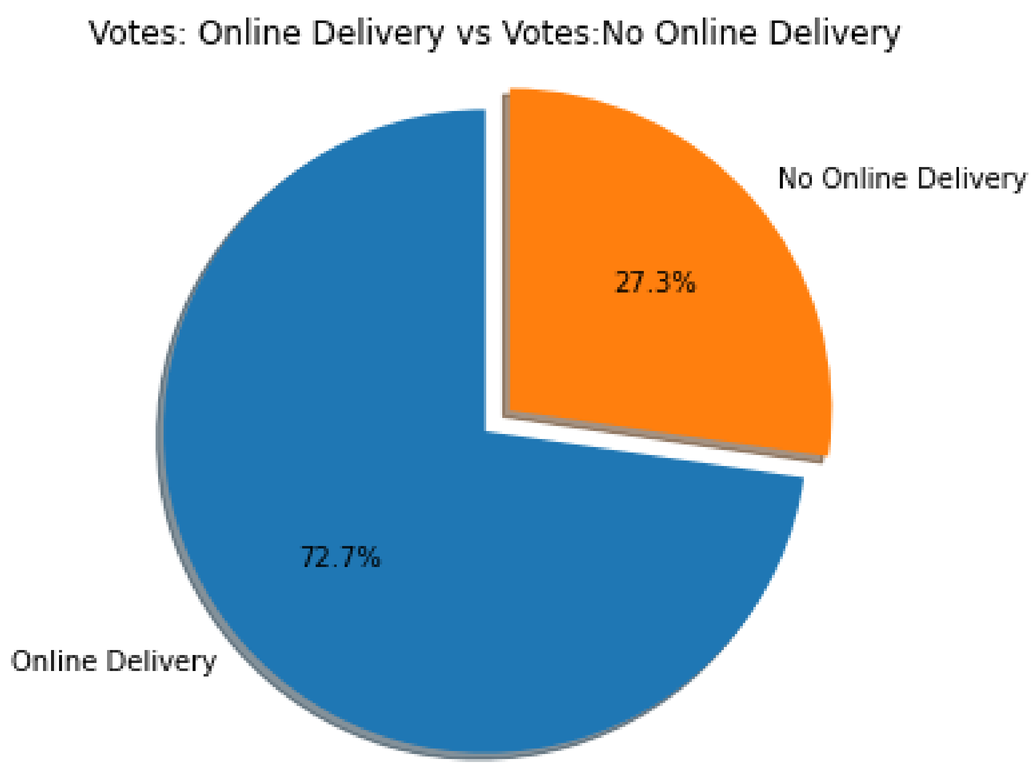
[28]:
```
<AxesSubplot:xlabel='Votes', ylabel='Has Online delivery'>
```



```
[29]: rest_deliver = merged1[merged1['Has Table booking_Yes'] == 1]['Votes'].sum()
rest_ndeliver = merged1[merged1['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:
680082
```

```
[30]: labels = 'Online Delivery','No Online Delivery'
size = [rest_ndeliver,rest_deliver]
explode = (0,0.1)
fig1,ax1 = plt.subplots(figsize=(5,5))
ax1.pie(size,explode=explode,labels=labels,autopct='%1.
↪1f%%',shadow=True,startangle=90)
ax1.set_title("Votes: Online Delivery vs Votes:No Online Delivery")
ax1.axis('equal')
plt.show()
#out of the total votes about 27.3% votes were given to restaurants that dont␣
↪have online delivery option
#out of the total votes about 72.7% votes were given to restaurants that dont␣
↪have online delivery option
#This clearly shows that restaurants that have online delivery are more likely␣
↪to get a vote(feedback)
```

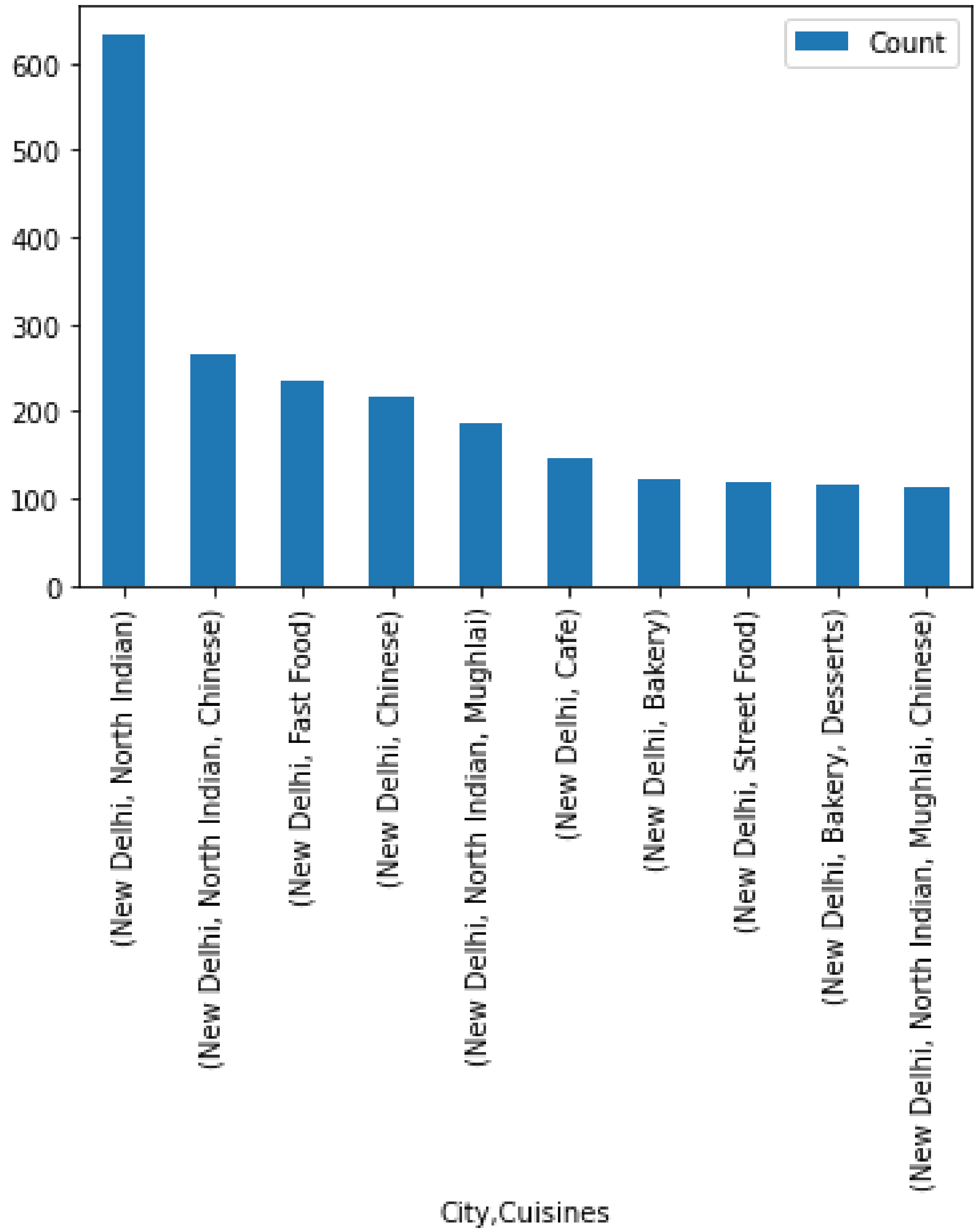


[31]:

```
# What are the top 10 cuisines served across cities?
top_10_couisines = merged.groupby(['City','Cuisines']).agg( Count =␣
↪('Cuisines','count'))
df=top_10_couisines.sort_values(by='Count',ascending=False)
#top_10_couisines = merged['Cuisines'].value_counts()
#top_10_couisines.head(10)
#top_10_couisines.plot(kind='barh')
df.head(10).plot(kind='bar')
```

[31]:

```
<AxesSubplot:xlabel='City,Cuisines'>
```



[33]:
```
# What is the maximum and minimum number of cuisines that a restaurant serves?
cuis_count = merged.groupby(['Restaurant Name','Cuisines']).agg( Count =␣
↪('Cuisines','count'))
cuis_count.sort_values(by='Count',ascending=False)
```

[33]:
```
                                                          Count
Restaurant Name     Cuisines
Cafe Coffee Day     Cafe                                     82
Domino's Pizza      Pizza, Fast Food                         72
```

```
Subway              American, Fast Food, Salad, Healthy Food     58
Green Chick Chop    Raw Meats, North Indian, Fast Food           46
McDonald's          Fast Food, Burger                            42
…                                                              …
Frozen Fantasy      Desserts, Beverages                           1
Frozen Factory      Desserts, Ice Cream                           1
                    Desserts, Beverages                           1
Frozen Adda         Ice Cream, Desserts                           1
Ìàukura€Ùa Sofras€± Kebab, Izgara                                 1

[7044 rows x 1 columns]
```

[34]:
```
# Also, which is the most served cuisine across the restaurant for each city?
cuis_count_ct = merged.groupby(['City','Cuisines']).agg( Count =␣
↪('Cuisines','count'))
cuis_count_ct.sort_values(by='Count',ascending=False)
```

[34]:
```
                                                          Count
City        Cuisines
New Delhi   North Indian                                    634
            North Indian, Chinese                           267
            Fast Food                                       236
            Chinese                                         217
            North Indian, Mughlai                           187
…                                                         …
Inner City  Tapas                                             1
Indore      North Indian, Mughlai, Seafood                    1
            North Indian, Continental, Mexican, Italian       1
            North Indian, Chinese, South Indian               1
€¡stanbul   World Cuisine, Patisserie, Cafe                   1

[2358 rows x 1 columns]
```

[35]:
```
merged.columns
```

[35]:
```
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', 'Price range', 'Aggregate rating',
       'Rating color', 'Rating text', 'Votes', 'Country'],
      dtype='object')
```

[36]:
```
cuisines = merged['Cuisines'].apply(lambda x: pd.Series(x.split(',')))
cuisines
```

[36]:
```
                 0                 1            2           3          4  \
4           French           Western          NaN         NaN        NaN
```

```
6       Indonesian              NaN           NaN         NaN        NaN
8          Western            Asian          Cafe         NaN        NaN
10          Korean              NaN           NaN         NaN        NaN
16            Cafe  Coffee and Tea      Western         NaN        NaN
…              …               …            …      …       …
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

               5    6    7
4            NaN  NaN  NaN
6            NaN  NaN  NaN
8            NaN  NaN  NaN
10           NaN  NaN  NaN
16           NaN  NaN  NaN
…            …    …    …
9546         NaN  NaN  NaN
9547         NaN  NaN  NaN
9548   Beverages  NaN  NaN
9549         NaN  NaN  NaN
9550         NaN  NaN  NaN

[8423 rows x 8 columns]
```

[37]:
```
cuisines.columns =␣
↪['Cuisine_1','Cuisine_2','Cuisine_3','Cuisine_4','Cuisine_5','Cuisine_6','Cuisine_7','Cuisi
cuisines.tail()
```

[37]:
```
        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
```

[38]:
```
df_cuisines = pd.concat([merged,cuisines],axis=1)
df_cuisines.head()
```

[38]:

```
    Restaurant ID            Restaurant Name  Country Code       City  \
4         7422489  Avec Moi Restaurant and Bar            94    Jakarta
6        18386856                     Onokabe            94  Tangerang
8        18391256                       MONKS            94    Jakarta
10       18425821                        OJJU            94    Jakarta
16       18400530        Noah's Barn Coffeenery            94    Bandung

                                             Address  \
4   Gedung PIC, Jl. Teluk Betung 43, Thamrin, Jakarta
6   Alam Sutera Town Center, Jl. Alam Utama, Serpo…
8   Komplek Graha Boulevard Timur, Summarecon Kela…
10  Gandaria City, Lantai Upper Ground, Jl. Sultan…
16              Jl. Dayang Sumbi No. 2, Dago, Bandung

                                 Locality  \
4                                 Thamrin
6   Alam Sutera Town Center, Serpong Utara
8                           Kelapa Gading
10              Gandaria City Mall, Gandaria
16                                   Dago

                                   Locality Verbose   Longitude  Latitude  \
4                                  Thamrin, Jakarta  106.821023 -6.196270
6   Alam Sutera Town Center, Serpong Utara, Tangerang  106.652688 -6.241792
8                            Kelapa Gading, Jakarta  106.911335 -6.163948
10             Gandaria City Mall, Gandaria, Jakarta  106.783162 -6.244221
16                                    Dago, Bandung  107.612790 -6.887058

                              Cuisines  …  Votes    Country  Cuisine_1  \
4                      French, Western  …    243  Indonesia     French
6                           Indonesian  …    155  Indonesia  Indonesian
8                 Western, Asian, Cafe  …    259  Indonesia    Western
10                              Korean  …    137  Indonesia     Korean
16  Cafe, Coffee and Tea, Western  …     22  Indonesia       Cafe

         Cuisine_2  Cuisine_3  Cuisine_4 Cuisine_5 Cuisine_6  Cuisine_7  \
4          Western        NaN        NaN       NaN       NaN        NaN
6              NaN        NaN        NaN       NaN       NaN        NaN
8            Asian       Cafe        NaN       NaN       NaN        NaN
10             NaN        NaN        NaN       NaN       NaN        NaN
16  Coffee and Tea    Western        NaN       NaN       NaN        NaN

   Cuisine_8
4        NaN
6        NaN
8        NaN
10       NaN
```

```
16       NaN

[5 rows x 28 columns]
```

[40]:
```
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_8']])
```

[41]:
```
cuisine_loc_stack=pd.DataFrame(cuisine_loc.stack()) #stacking the columns
cuisine_loc.head()
```

[41]:
```
      Country       City                                   Locality Verbose  \
4   Indonesia    Jakarta                                   Thamrin, Jakarta
6   Indonesia  Tangerang  Alam Sutera Town Center, Serpong Utara, Tangerang
8   Indonesia    Jakarta                             Kelapa Gading, Jakarta
10  Indonesia    Jakarta               Gandaria City Mall, Gandaria, Jakarta
16  Indonesia    Bandung                                      Dago, Bandung

     Cuisine_1        Cuisine_2 Cuisine_3 Cuisine_4 Cuisine_5 Cuisine_6  \
4       French          Western       NaN       NaN       NaN       NaN
6   Indonesian              NaN       NaN       NaN       NaN       NaN
8      Western            Asian      Cafe       NaN       NaN       NaN
10      Korean              NaN       NaN       NaN       NaN       NaN
16        Cafe   Coffee and Tea   Western       NaN       NaN       NaN

   Cuisine_7 Cuisine_8
4        NaN       NaN
6        NaN       NaN
8        NaN       NaN
10       NaN       NaN
16       NaN       NaN
```

[42]:
```
cuisine_loc_stack.head(10)
```

[42]:
```
                                                                     0
4 Country                                                    Indonesia
  City                                                         Jakarta
  Locality Verbose                                    Thamrin, Jakarta
  Cuisine_1                                                     French
  Cuisine_2                                                    Western
6 Country                                                    Indonesia
  City                                                       Tangerang
  Locality Verbose  Alam Sutera Town Center, Serpong Utara, Tangerang
  Cuisine_1                                                 Indonesian
8 Country                                                    Indonesia
```

[43]:

```
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
a
```

[43]:

```
                                        Locality Verbose   variable  \
0                                      Thamrin, Jakarta  Cuisine_1
1       Alam Sutera Town Center, Serpong Utara, Tangerang  Cuisine_1
2                                 Kelapa Gading, Jakarta  Cuisine_1
3                   Gandaria City Mall, Gandaria, Jakarta  Cuisine_1
4                                         Dago, Bandung  Cuisine_1
…                                                   …          …
67379                                  Jakhan, Dehradun  Cuisine_8
67380                                Mall Road, Kanpur  Cuisine_8
67381                                   Parade, Kanpur  Cuisine_8
67382                       Dashaswmedh Road, Varanasi  Cuisine_8
67383                                  Sigra, Varanasi  Cuisine_8

         Cuisines
0          French
1       Indonesian
2         Western
3          Korean
4            Cafe
…             …
67379         NaN
67380         NaN
67381         NaN
67382         NaN
67383         NaN

[67384 rows x 3 columns]
```

[44]:

```
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
```

[44]:

```
                              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                  A Hotel, Gurdev Nagar, Ludhiana     North Indian      1
…                                                …          …     …
9001                            ÌÏmitkÌ_y, Ankara            Kebab      1
9002                            ÌÏmitkÌ_y, Ankara         Desserts      1
9003                            ÌÏmitkÌ_y, Ankara    Turkish Pizza      1
9004                          Ìàukurambar, Ankara      Patisserie      1
9005                          Ìàukurambar, Ankara   Coffee and Tea      1

[9006 rows x 3 columns]
```

[45]:
```
#find the highest restuarant in the city
loc=max_rate.sort_values('Count', ascending=False).groupby(by=['Locality␣
↪Verbose'],as_index=False).first()
loc
```

[45]:
```
                                       Locality Verbose         Cuisines  Count
0             ILD Trade Centre Mall, Sohna Road, Gurgaon            Cafe      1
1                        A Hotel, Gurdev Nagar, Ludhiana       Fast Food      1
2                   ARSS Mall, Paschim Vihar, New Delhi       Fast Food      1
3                                  Aaya Nagar, New Delhi  Cuisine Varies      1
4      Abu Dhabi Mall, Tourist Club Area  (Al Zahiyah…        American      1
…                                                   …             …     …
1042                               Zoo Tiniali, Guwahati         Chinese      2
1043                  ibis New Delhi, Aerocity, New Delhi       Ice Cream      1
1044                             ÌÅguas Claras, BrasÌ_lia           Grill      1
1045                                   ÌÏmitkÌ_y, Ankara   Turkish Pizza      1
1046                                 Ìàukurambar, Ankara      Patisserie      1

[1047 rows x 3 columns]
```

[47]:
```
rating_res=loc.merge(merged1,left_on='Locality Verbose',right_on='Locality␣
↪Verbose',how='inner')
#inner join to merge the two dataframe
rating_res
```

[47]:
```
                                 Locality Verbose      Cuisines_x  Count  \
0       ILD Trade Centre Mall, Sohna Road, Gurgaon            Cafe      1
1       ILD Trade Centre Mall, Sohna Road, Gurgaon            Cafe      1
2                  A Hotel, Gurdev Nagar, Ludhiana       Fast Food      1
3             ARSS Mall, Paschim Vihar, New Delhi       Fast Food      1
4                            Aaya Nagar, New Delhi  Cuisine Varies      1
…                                               …             …     …
9272                      ÌÅguas Claras, BrasÌ_lia           Grill      1
9273                      ÌÅguas Claras, BrasÌ_lia           Grill      1
9274                      ÌÅguas Claras, BrasÌ_lia           Grill      1
9275                             ÌÏmitkÌ_y, Ankara   Turkish Pizza      1
9276                           Ìàukurambar, Ankara      Patisserie      1
```

```
      Restaurant ID    Restaurant Name  Country Code       City  \
0          18237941       Pind Balluchi             1    Gurgaon
1          18396451               K Lab             1    Gurgaon
2             15239  Basant Restaurant              1   Ludhiana
3            310281          Haldiram's             1  New Delhi
4          18287358          Food Cloud             1  New Delhi
…               …                 …           …          …
9272        6601515            Rovereto            30  BrasÌ_lia
9273        6601602            Taco Pep            30  BrasÌ_lia
9274        6601361         Buena Carne            30  BrasÌ_lia
9275        6000921         DÌ_vero€Ùlu           208     Ankara
9276        6003426                Liva           208     Ankara

                                                Address  \
0     112/112-A, 1st Floor, ILD Trade Centre, Near S…
1     Shop GF-18, ILD Trade Centre, Sector 47, Near …
2     Urban Estate, Main Market, Phase 1, Dugri, Lud…
3     1st Floor, ARSS Mall, Opposite Jwalaheri, Pasc…
4                                  Aaya Nagar, New Delhi
…                                                   …
9272     Rua 13 Norte, Lote 4, ÌÅguas Claras, BrasÌ_lia
9273  Vila Malls, Avenida das Castanheiras, Lote 106…
9274  Avenida AraucÌÁrias, 1325, Loja 19, ÌÅguas Cla…
9275  ÌÏmitkÌ_y Mahallesi, 2432. Cadde (8. Cadde), N…
9276  Ìàukurambar Mahallesi, Muhsin Yaz€±c€±o€Ùlu Ca…

                              Locality  Longitude  …  \
0      ILD Trade Centre Mall, Sohna Road  77.039220  …
1      ILD Trade Centre Mall, Sohna Road  77.039310  …
2                  A Hotel, Gurdev Nagar  75.842739  …
3               ARSS Mall, Paschim Vihar  77.101544  …
4                             Aaya Nagar   0.000000  …
…                                    …        …  …
9272                       ÌÅguas Claras -48.019000  …
9273                       ÌÅguas Claras -48.016667  …
9274                       ÌÅguas Claras -48.019092  …
9275                           ÌÏmitkÌ_y  32.701775  …
9276                         Ìàukurambar  32.809146  …

      Average Cost for two             Currency  Price range Aggregate rating  \
0                      800  Indian Rupees(Rs.)            2              2.7
1                      350  Indian Rupees(Rs.)            1              3.4
2                      800  Indian Rupees(Rs.)            2              3.6
3                      500  Indian Rupees(Rs.)            2              3.1
4                      500  Indian Rupees(Rs.)            2              0.0
…                      …                  …           …               …
```

```
9272                   100  Brazilian Real(R$)            4             3.1
9273                   100  Brazilian Real(R$)            4             4.3
9274                    60  Brazilian Real(R$)            3             3.6
9275                    70    Turkish Lira(TL)            3             4.2
9276                    50    Turkish Lira(TL)            2             3.4

      Rating color  Rating text Votes Country  Has Table booking_Yes  \
0           Orange      Average    80   India                      1
1           Orange      Average    16   India                      0
2           Yellow         Good    93   India                      0
3           Orange      Average   117   India                      0
4            White    Not rated     2   India                      0
…                …            …   …     …                    …
9272        Orange      Average     9  Brazil                      0
9273         Green    Very Good    29  Brazil                      0
9274        Yellow         Good     9  Brazil                      0
9275         Green    Very Good   152  Turkey                      0
9276        Orange      Average   115  Turkey                      0

     Has Online delivery_Yes
0                          1
1                          0
2                          0
3                          0
4                          0
…                        …
9272                       0
9273                       0
9274                       0
9275                       0
9276                       0

[9277 rows x 22 columns]
```

[48]:
```python
df=pd.DataFrame(rating_res[['Country','City','Locality␣
↪Verbose','Cuisines_x','Count']])
#making a dataframe of rating restaurant
df
```

[48]:
```
     Country       City                            Locality Verbose  \
0      India    Gurgaon   ILD Trade Centre Mall, Sohna Road, Gurgaon
1      India    Gurgaon   ILD Trade Centre Mall, Sohna Road, Gurgaon
2      India   Ludhiana              A Hotel, Gurdev Nagar, Ludhiana
3      India  New Delhi          ARSS Mall, Paschim Vihar, New Delhi
4      India  New Delhi                        Aaya Nagar, New Delhi
…        …        …                                          …
9272  Brazil  BrasÌ_lia                     ÌÅguas Claras, BrasÌ_lia
```

```
9273  Brazil  BrasÌ_lia                     ÌÅguas Claras, BrasÌ_lia
9274  Brazil  BrasÌ_lia                     ÌÅguas Claras, BrasÌ_lia
9275  Turkey     Ankara                            ÌÏmitkÌ_y, Ankara
9276  Turkey     Ankara                         Ìàukurambar, Ankara

          Cuisines_x  Count
0               Cafe      1
1               Cafe      1
2          Fast Food      1
3          Fast Food      1
4     Cuisine Varies      1
…                …     …
9272           Grill      1
9273           Grill      1
9274           Grill      1
9275   Turkish Pizza      1
9276      Patisserie      1

[9277 rows x 5 columns]
```

[49]:

```
country=rating_res.sort_values('Count', ascending=False).
 ↪groupby(by=['Country'],as_index=False).first()
#grouping the data by country code
country
```

[49]:

```
           Country                                  Locality Verbose  \
0        Australia                                  Tanunda, Tanunda
1           Brazil                              Leme, Rio de Janeiro
2           Canada                                  Yorkton, Yorkton
3            India                               Mahipalpur, New Delhi
4        Indonesia                                  Thamrin, Jakarta
5      New Zealand                          Te Aro, Wellington City
6      Phillipines  UP Town Center, Diliman, Quezon City, Quezon City
7            Qatar  The Westin Doha Hotel & Spa, Fereej Bin Mahmou…
8        Singapore             Telok Ayer Street, Outram, Singapore
9     South Africa                                    CBD, Cape Town
10       Sri Lanka          Cinnamon Gardens, Colombo 07, Colombo
11          Turkey                          Gazi Osman PaÅÙa, Ankara
12             UAE                              Abu Shagara, Sharjah
13  United Kingdom                               Old Town, Edinburgh
14   United States                                  Dubuque, Dubuque

      Cuisines_x  Count  Restaurant ID  \
0     Australian      1       16608059
1      Brazilian      2        7302637
2          Asian      1       16668008
3   North Indian     45         305189
```

```
4        Western      1        7422489
5           Cafe      5        7101483
6        Mexican      1        6318433
7           Thai      1       18261203
8    Finger Food      1       18483446
9           Cafe      2        6400421
10          Cafe      2        5800891
11 World Cuisine      2        6000409
12        Indian      2        5602751
13          Cafe      2        7600097
14      American      9       17342771

                              Restaurant Name  Country Code             City  \
0                        1918 Bistro & Grill            14          Tanunda
1                                 Leme Light            30   Rio de Janeiro
2                               Arigato Sushi            37          Yorkton
3                               Yadav Sweets             1        New Delhi
4                 Avec Moi Restaurant and Bar            94          Jakarta
5                               Burger Liquor           148  Wellington City
6                            Silantro Fil-Mex           162      Quezon City
7    Sabai Thai - The Westin Doha Hotel & Spa           166             Doha
8                             Bitters & Love           184        Singapore
9                               Truth Coffee           189        Cape Town
10                            The Paddington           191          Colombo
11                                   Cafemiz           208           Ankara
12                            Vadakkan Pepper           214          Sharjah
13                               Love Crumbs           215        Edinburgh
14                             Fiesta Cancun           216          Dubuque

                                              Address  \
0                                94 Murray St, Tanunda, SA
1      Rua Gustavo Sampaio, 798, Leme, Rio de Janeiro
2            14 Second Ave North, Yorkton, SK S3N 1G1
3   Old Rangpuri, Near Sabzi Mandi, Mahipalpur, Ne…
4   Gedung PIC, Jl. Teluk Betung 43, Thamrin, Jakarta
5         129 Willis Street, Te Aro, Wellington City
6   Second Floor, UP Town Center, Katipunan Avenue…
7   Ground Floor, The Westin Doha Hotel & Spa, Fer…
8                         118 Telok Ayer Street 068587
9                 36 Buitenkant Street, CBD, Cape Town
10     36, Barnes Place, Cinnamon Gardens, Colombo 07
11  GaziosmanpaÅÙa Mahallesi, Arjantin Caddesi, No…
12  Near New City Center Supermarket, Abu Shagara,…
13         155 West Port, Old Town, Edinburgh EH3 9DP
14                 2515 NW Arterial, Dubuque, IA 52002

                                        Locality  …  \
```

```
0                                        Tanunda  ...
1                                           Leme  ...
2                                        Yorkton  ...
3                                     Mahipalpur  ...
4                                        Thamrin  ...
5                                         Te Aro  ...
6               UP Town Center, Diliman, Quezon City  ...
7    The Westin Doha Hotel & Spa, Fereej Bin Mahmoud  ...
8                       Telok Ayer Street, Outram  ...
9                                            CBD  ...
10                   Cinnamon Gardens, Colombo 07  ...
11                               Gazi Osman PaÅÙa  ...
12                                    Abu Shagara  ...
13                                       Old Town  ...
14                                        Dubuque  ...

                        Cuisines_y  Average Cost for two  \
0    Modern Australian, Australian                    30
1                        Brazilian                    40
2                            Asian                    25
3                Mithai, Street Food                 150
4                  French, Western                350000
5                         American                    55
6                 Filipino, Mexican                  800
7                             Thai                   445
8                      Finger Food                    40
9                             Cafe                   150
10                   Cafe, Italian                  2000
11  World Cuisine, Mexican, Italian                   150
12                     South Indian                    70
13                     Bakery, Cafe                    15
14                          Mexican                    10

                    Currency  Price range Aggregate rating  Rating color  \
0                 Dollar($)            3              4.4         Green
1       Brazilian Real(R$)            2              4.2         Green
2                 Dollar($)            2              3.3        Orange
3        Indian Rupees(Rs.)            1              0.0         White
4   Indonesian Rupiah(IDR)            3              4.3         Green
5             NewZealand($)            3              4.1         Green
6          Botswana Pula(P)            3              4.8    Dark Green
7           Qatari Rial(QR)            4              4.3         Green
8                 Dollar($)            3              3.9        Yellow
9                   Rand(R)            2              4.4         Green
10   Sri Lankan Rupee(LKR)            3              3.6        Yellow
11         Turkish Lira(TL)            4              4.4         Green
12      Emirati Diram(AED)            3              3.8        Yellow
```

```
13             Pounds(å£)          2           4.1        Green
14              Dollar($)          1           3.6       Yellow

   Rating text Votes Has Table booking_Yes  Has Online delivery_Yes
0     Very Good   339                    0                        0
1     Very Good     7                    0                        0
2       Average    26                    0                        0
3     Not rated     1                    0                        0
4     Very Good   243                    0                        0
5     Very Good   116                    0                        0
6     Excellent   294                    0                        0
7     Very Good    73                    0                        0
8          Good    35                    0                        0
9     Very Good   514                    0                        0
10         Good    83                    0                        0
11    Very Good   115                    0                        0
12         Good   210                    0                        1
13    Very Good    57                    0                        0
14         Good   156                    0                        0

[15 rows x 22 columns]
```

[52]:

```python
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
con
```

[52]:

```
           Country              City  \
0        Australia           Tanunda
1           Brazil    Rio de Janeiro
2           Canada           Yorkton
3            India         New Delhi
4        Indonesia           Jakarta
5      New Zealand   Wellington City
6      Phillipines       Quezon City
7            Qatar              Doha
8        Singapore         Singapore
9     South Africa         Cape Town
10       Sri Lanka           Colombo
11          Turkey            Ankara
12             UAE           Sharjah
13  United Kingdom         Edinburgh
14   United States           Dubuque

                                          Locality      Cuisines  \
0                                          Tanunda    Australian
```

```
1                                                  Leme       Brazilian
2                                               Yorkton           Asian
3                                            Mahipalpur   North Indian
4                                               Thamrin         Western
5                                                Te Aro            Cafe
6                  UP Town Center, Diliman, Quezon City         Mexican
7    The Westin Doha Hotel & Spa, Fereej Bin Mahmoud               Thai
8                              Telok Ayer Street, Outram    Finger Food
9                                                   CBD            Cafe
10                        Cinnamon Gardens, Colombo 07            Cafe
11                                    Gazi Osman PaÅÙa  World Cuisine
12                                          Abu Shagara          Indian
13                                             Old Town            Cafe
14                                              Dubuque        American

    Number of restaurants in the country
0                                       1
1                                       2
2                                       1
3                                      45
4                                       1
5                                       5
6                                       1
7                                       1
8                                       1
9                                       2
10                                      2
11                                      2
12                                      2
13                                      2
14                                      9
```

[53]:
```
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]
```

[53]:
```
           Country             City                      Locality  \
3            India        New Delhi                    Mahipalpur
14   United States          Dubuque                       Dubuque
5      New Zealand  Wellington City                        Te Aro
1           Brazil   Rio de Janeiro                          Leme
9     South Africa        Cape Town                           CBD
10       Sri Lanka          Colombo  Cinnamon Gardens, Colombo 07
11          Turkey           Ankara             Gazi Osman PaÅÙa
12             UAE          Sharjah                   Abu Shagara
13  United Kingdom        Edinburgh                      Old Town
```

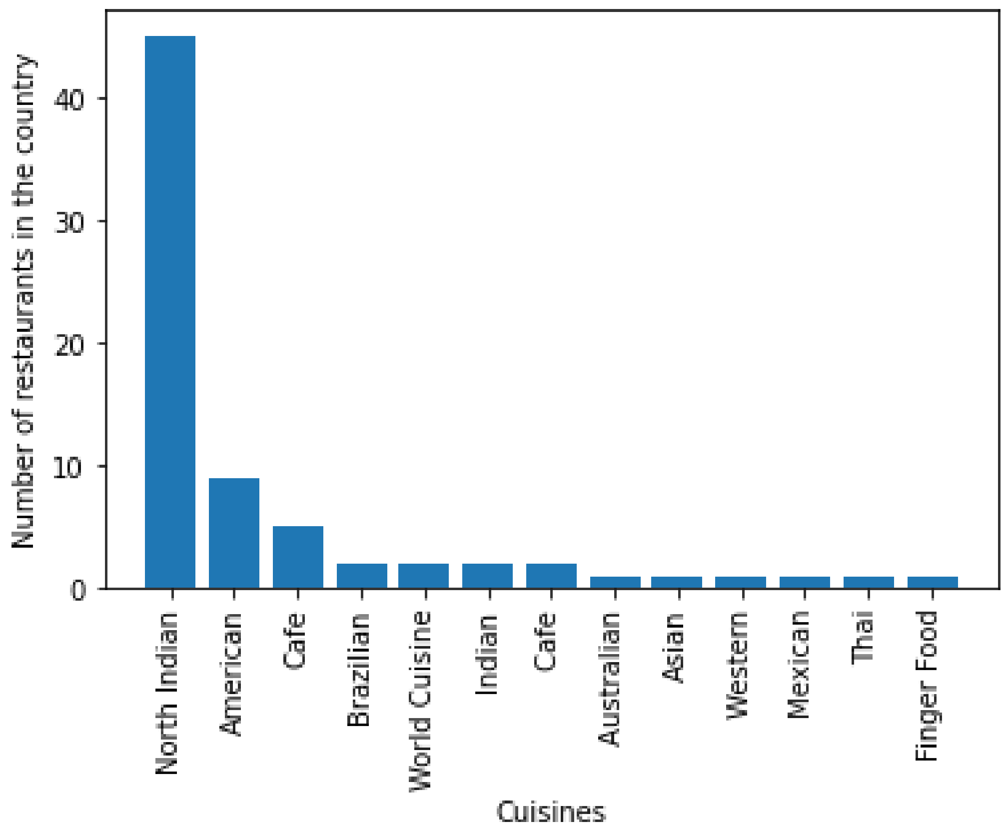
```
0        Australia          Tanunda                       Tanunda

         Cuisines  Number of restaurants in the country
3    North Indian                                    45
14       American                                     9
5            Cafe                                     5
1       Brazilian                                     2
9            Cafe                                     2
10           Cafe                                     2
11  World Cuisine                                     2
12         Indian                                     2
13           Cafe                                     2
0      Australian                                     1
```

[54]:

```
import matplotlib.pyplot as plt
plt.bar(con1['Cuisines'],con1['Number of restaurants in the country'])

plt.xlabel("Cuisines")
plt.ylabel("Number of restaurants in the country")
plt.xticks(rotation=90)

#con1.plot(kind='bar')
```

[54]:

```
([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12],
 [Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, '')])
```



[56]:
```
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()
```

[56]:
```
                Restaurant Name      City   Cuisine_1       Cuisine_2  \
4   Avec Moi Restaurant and Bar   Jakarta      French         Western
6                       Onokabe  Tangerang  Indonesian             NaN
8                         MONKS   Jakarta     Western           Asian
10                         OJJU   Jakarta      Korean             NaN
16         Noah's Barn Coffeenery   Bandung        Cafe   Coffee and Tea

   Cuisine_3 Cuisine_4 Cuisine_5 Cuisine_6 Cuisine_7 Cuisine_8
4        NaN       NaN       NaN       NaN       NaN       NaN
6        NaN       NaN       NaN       NaN       NaN       NaN
8       Cafe       NaN       NaN       NaN       NaN       NaN
10       NaN       NaN       NaN       NaN       NaN       NaN
16   Western       NaN       NaN       NaN       NaN       NaN
```

[57]:
```
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(10)
```

[57]:

	Restaurant Name	Cuisines	Count
0	12212	Fast Food	1
1	Let's Burrrp	Chinese	1
2	Let's Burrrp	North Indian	1
3	#45	Cafe	1
4	#Dilliwaala6	North Indian	1
5	#InstaFreeze	Ice Cream	1
6	#Urban CafÌ©	North Indian	1
7	#Urban CafÌ©	Chinese	1
8	#Urban CafÌ©	Italian	1
9	#hashtag	Cafe	1

[58]:
```
max_rate1.sort_values('Count',ascending=False)
#Cafe Coffee Day has the max number of cuisines and The least number of␣
 ↪cuisines in a resaurant is 1.
```

[58]:

	Restaurant Name	Cuisines	Count
2139	Cafe Coffee Day	Cafe	82
4031	Domino's Pizza	Pizza	73
4032	Domino's Pizza	Fast Food	72
11200	Subway	Healthy Food	59
11199	Subway	Salad	59
…	…	…	…
4775	Frontier - The Ashok	North Indian	1
4776	Frontier - The Ashok	Mughlai	1
4777	Frontier Restaurant	North Indian	1
4778	Frontier Restaurant	Chinese	1
13694	Ìàukura€Ùa Sofras€±	Izgara	1

[13695 rows x 3 columns]

[59]:
```
rating = merged1[['Restaurant ID','Restaurant Name','Country','City','Aggregate␣
 ↪rating','Average Cost for two','Votes','Price range','Has Table␣
 ↪booking_Yes','Has Online delivery_Yes']]
```

[61]:
```
rating = rating.merge(max_rate1,left_on='Restaurant Name',right_on='Restaurant␣
↪Name',how='left')
rating
```

[61]:
```
       Restaurant ID              Restaurant Name    Country      City  \
0            7402935                         Skye  Indonesia   Jakarta
1            7410290     Satoo - Hotel Shangri-La  Indonesia   Jakarta
2            7420899                   Sushi Masa  Indonesia   Jakarta
3            7421967              3 Wise Monkeys  Indonesia   Jakarta
4            7422489  Avec Moi Restaurant and Bar  Indonesia   Jakarta
…                …                          …        …        …
21975       18312106                   UrbanCrave      India    Kanpur
21976       18312106                   UrbanCrave      India    Kanpur
21977        3900245           Deena Chat Bhandar      India  Varanasi
21978       18246202              VNS Live Studio      India  Varanasi
21979       18246202              VNS Live Studio      India  Varanasi

       Aggregate rating  Average Cost for two  Votes  Price range  \
0                   4.1                800000   1498            3
1                   4.6                800000    873            3
2                   4.9                500000    605            3
3                   4.2                450000    395            3
4                   4.3                350000    243            3
…                 …                   …     …          …
21975               3.9                     0    127            1
21976               3.9                     0    127            1
21977               3.8                     0     78            1
21978               3.5                     0    109            1
21979               3.5                     0    109            1

       Has Table booking_Yes  Has Online delivery_Yes       Cuisines  Count
0                          0                        0            NaN    NaN
1                          0                        0            NaN    NaN
2                          0                        0            NaN    NaN
3                          0                        0            NaN    NaN
4                          0                        0         French    1.0
…                      …                       …            …    …
21975                      0                        0        Italian    1.0
21976                      0                        0      Beverages    1.0
21977                      0                        0    Street Food    1.0
21978                      0                        0        Chinese    1.0
21979                      0                        0   North Indian    1.0

[21980 rows x 12 columns]
```

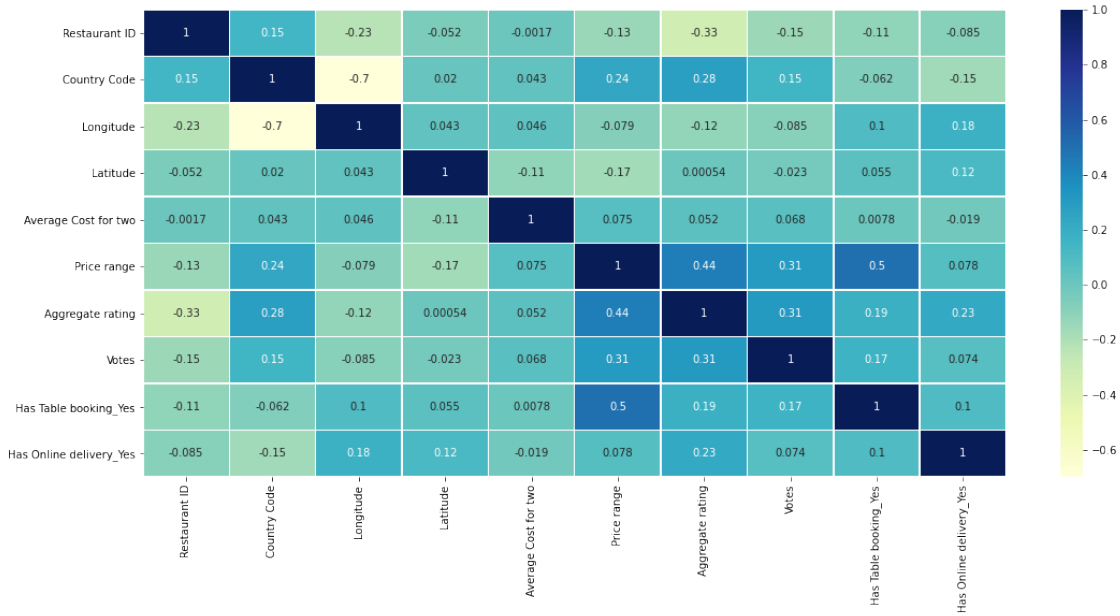
[62]:
```
merged1.corr()
```

[62]:

```
                         Restaurant ID  Country Code  Longitude  Latitude  \
Restaurant ID                 1.000000      0.148447  -0.226073 -0.052111
Country Code                  0.148447      1.000000  -0.698298  0.019784
Longitude                    -0.226073     -0.698298   1.000000  0.043213
Latitude                     -0.052111      0.019784   0.043213  1.000000
Average Cost for two         -0.001696      0.043224   0.045892 -0.111089
Price range                  -0.134419      0.243393  -0.078974 -0.166668
Aggregate rating             -0.326144      0.282234  -0.116843  0.000541
Votes                        -0.146895      0.154593  -0.085141 -0.022927
Has Table booking_Yes        -0.110118     -0.061695   0.100497  0.054648
Has Online delivery_Yes      -0.085157     -0.154627   0.178773  0.118709

                         Average Cost for two  Price range  Aggregate rating  \
Restaurant ID                       -0.001696    -0.134419         -0.326144
Country Code                         0.043224     0.243393          0.282234
Longitude                            0.045892    -0.078974         -0.116843
Latitude                            -0.111089    -0.166668          0.000541
Average Cost for two                 1.000000     0.075093          0.051797
Price range                          0.075093     1.000000          0.437874
Aggregate rating                     0.051797     0.437874          1.000000
Votes                                0.067794     0.309308          0.313598
Has Table booking_Yes                0.007757     0.502025          0.190045
Has Online delivery_Yes             -0.018976     0.078007          0.225772

                            Votes  Has Table booking_Yes  \
Restaurant ID           -0.146895              -0.110118
Country Code             0.154593              -0.061695
Longitude               -0.085141               0.100497
Latitude                -0.022927               0.054648
Average Cost for two     0.067794               0.007757
Price range              0.309308               0.502025
Aggregate rating         0.313598               0.190045
Votes                    1.000000               0.169497
Has Table booking_Yes    0.169497               1.000000
Has Online delivery_Yes  0.074399               0.101204

                         Has Online delivery_Yes
Restaurant ID                          -0.085157
Country Code                           -0.154627
Longitude                               0.178773
Latitude                                0.118709
Average Cost for two                   -0.018976
Price range                             0.078007
Aggregate rating                        0.225772
Votes                                   0.074399
Has Table booking_Yes                   0.101204
Has Online delivery_Yes                 1.000000
```

[63]:

```
fig, ax = plt.subplots(figsize=(18,8))
dataplot = sns.heatmap(merged1.corr(), cmap="YlGnBu", annot=True,linewidth=0.
↪5,ax=ax)
#heat = merged1.pivot("Average_Cost_for_two", "Aggregate_rating")
#ax = sns.heatmap(heat, annot=True, fmt="d")
```



We see that there is no single variable that affects the rating strongly, however table booking,online delivery,avg price for two and price range, number of votes do play a part in affecting the rating of a restaurant.