airbnb-dataset-analysis

February 10, 2023

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

[2]:
```
dataset=pd.read_csv('/content/Airbnb data.csv')
```

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

[3]:

	room_id	survey_id	host_id	room_type	country	city	borough	neighborhood	reviews	overall_satisfaction	accommodates	bedrooms	bathrooms	price	minstay	name	last_modified
0	10176931	1476	49180562	Shared room	NaN	Amsterdam	NaN	De Pijp / Rivierenbuurt	7	4.5	2	1.0	NaN	156.0	NaN	Red Light/ Canal view apartment (Shared)	2017-07-23 13:06:27.391699
1	8935871	1476	46718394	Shared room	NaN	Amsterdam	NaN	Centrum West	45	4.5	4	1.0	NaN	126.0	NaN	Sunny and Cozy Living room in quite neighbours	2017-07-23 13:06:23.607187
2	14011697	1476	10346595	Shared room	NaN	Amsterdam	NaN	Watergraafsmeer	1	0.0	3	1.0	NaN	132.0	NaN	Amsterdam	2017-07-23 13:06:23.603546
3	6137978	1476	8685430	Shared room	NaN	Amsterdam	NaN	Centrum West	7	5.0	4	1.0	NaN	121.0	NaN	Canal boat RIDE in Amsterdam	2017-07-23 13:06:22.689787
4	18630616	1476	70191803	Shared room	NaN	Amsterdam	NaN	De Baarsjes / Oud West	1	0.0	2	1.0	NaN	93.0	NaN	One room for rent in a three room appartment	2017-07-23 13:06:19.681469

```
    latitude  longitude                                           location
0  52.356209   4.887491  0101000020E610000033FAD170CA8C13403BC5AA41982D…
1  52.378518   4.896120  0101000020E6100000842A357BA095134042791F477330…
2  52.338811   4.943592  0101000020E6100000A51133FB3CC613403543AA285E2B…
3  52.376319   4.890028  0101000020E6100000DF180280638F134085EE92382B30…
4  52.370384   4.852873  0101000020E6100000CD902A8A57691340187B2FBE682F…
```

[4]:
```
#no. of missing values
dataset.isnull().sum()
```

[4]:
```
room_id                    0
survey_id                  0
host_id                    0
room_type                  0
country                18723
city                       0
borough                18723
neighborhood               0
reviews                    0
overall_satisfaction       0
accommodates               0
bedrooms                   0
bathrooms              18723
price                      0
minstay                18723
name                      52
last_modified              0
latitude                   0
longitude                  0
location                   0
dtype: int64
```

[5]:
```
dataset.shape
```

[5]:
```
(18723, 20)
```

[6]:
```
#The columns country,borough,bathrooms and minstay are completely null.
#so we drop them.
dataset.drop(columns=['country','borough','bathrooms','minstay'],inplace=True)
```

[7]:
```
dataset.isnull().sum()
```

[7]:
```
room_id                0
survey_id              0
host_id                0
room_type              0
city                   0
```

```
neighborhood             0
reviews                  0
overall_satisfaction     0
accommodates             0
bedrooms                 0
price                    0
name                    52
last_modified            0
latitude                 0
longitude                0
location                 0
dtype: int64
```

[8]:
```
#name and other columns have very less null values.
#so we drop the rows corresponding to these null values.
dataset.dropna(inplace=True)
```

[9]:
```
dataset.isnull().sum()
```

[9]:
```
room_id                 0
survey_id               0
host_id                 0
room_type               0
city                    0
neighborhood            0
reviews                 0
overall_satisfaction    0
accommodates            0
bedrooms                0
price                   0
name                    0
last_modified           0
latitude                0
longitude               0
location                0
dtype: int64
```

[10]:
```
#now there are no missing values in the dataset.
```

[11]:
```
rooms=dataset['room_type'].value_counts()
```

[12]:
```
rooms
```

[12]:
```
Entire home/apt    14937
Private room        3671
Shared room           63
Name: room_type, dtype: int64
```

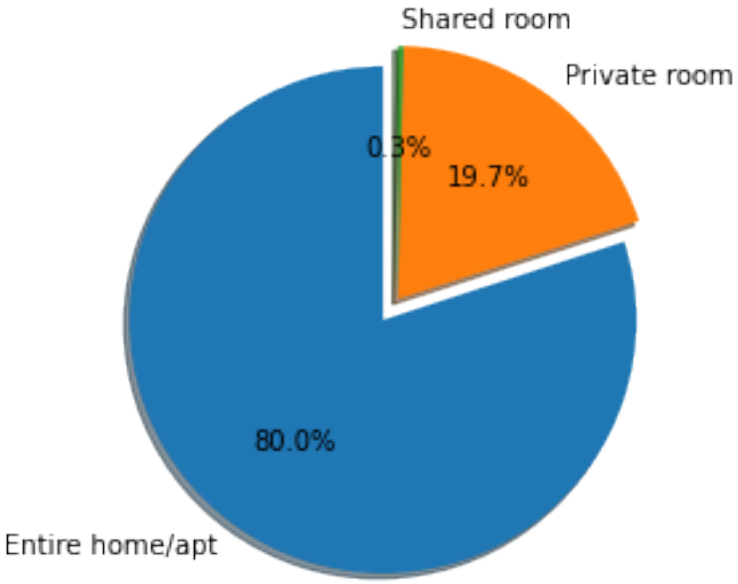
[13]:
```
#visualize using pie chart

labels = ['Entire home/apt','Private room','Shared room']

explode = (0.1, 0, 0)  # only "explode" the 1st slice

fig1, ax1 = plt.subplots()
ax1.pie(rooms, explode=explode, labels=labels, autopct='%1.1f%%',
        shadow=True, startangle=90)
ax1.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.

plt.show()
```



[14]:
```
#Shared room is just 0.3 % of all the room types.
#Guests prefer entire home or apartment much more than the shared rooms and␣
 ↪private rooms.
```

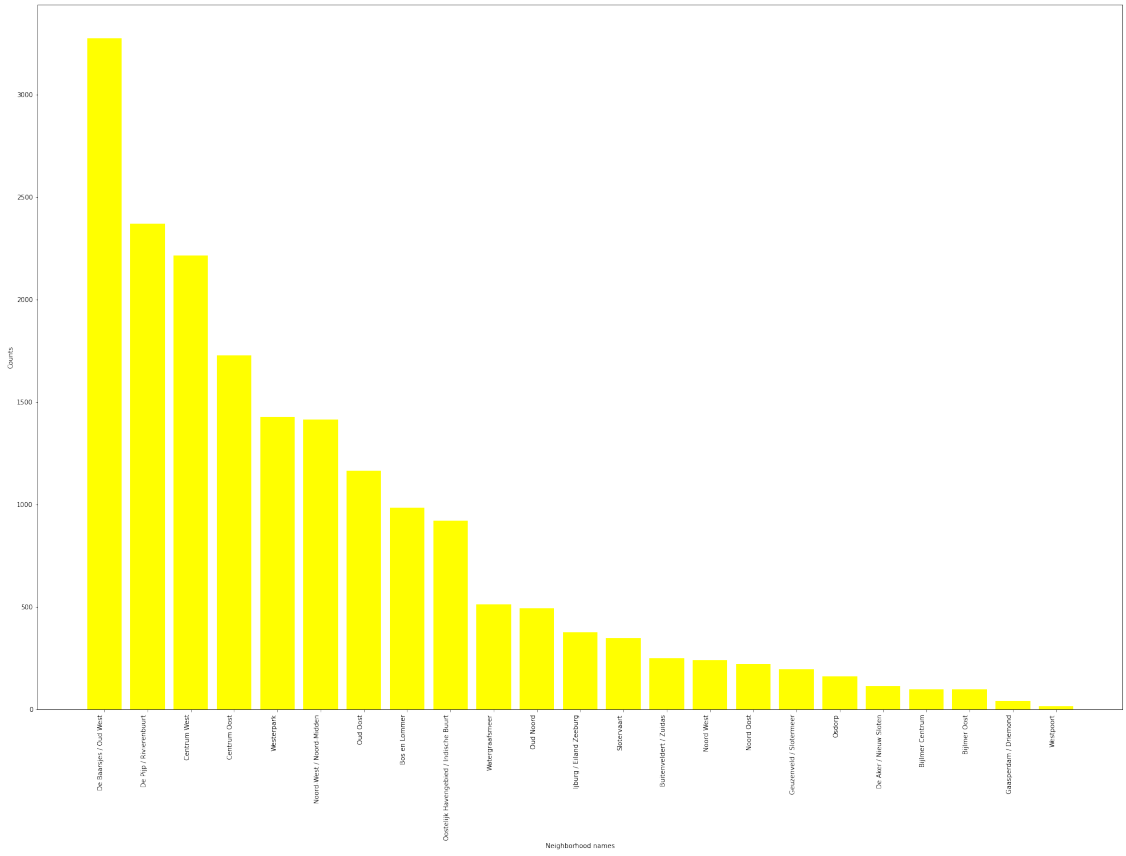
[15]:
```
#finding the neighbourhood which has the most occurence in the dataset.
dataset['neighborhood'].value_counts()
```

[15]:
```
De Baarsjes / Oud West          3276
De Pijp / Rivierenbuurt         2371
Centrum West                    2216
Centrum Oost                    1727
Westerpark                      1428
Noord-West / Noord-Midden       1415
```

```
Oud Oost                                    1166
Bos en Lommer                                983
Oostelijk Havengebied / Indische Buurt       920
Watergraafsmeer                              514
Oud Noord                                    494
Ijburg / Eiland Zeeburg                      377
Slotervaart                                  348
Buitenveldert / Zuidas                       250
Noord West                                   240
Noord Oost                                   221
Geuzenveld / Slotermeer                      195
Osdorp                                       163
De Aker / Nieuw Sloten                       114
Bijlmer Centrum                               99
Bijlmer Oost                                  97
Gaasperdam / Driemond                         42
Westpoort                                     15
Name: neighborhood, dtype: int64
```

[16]:
```
neighborhood_count=dataset['neighborhood'].value_counts().to_list()
figure=plt.figure(figsize=[30,20])
plt.bar(dataset['neighborhood'].value_counts().
  ↪index,neighborhood_count,color='yellow')
plt.xticks(rotation=90,ha='right')
plt.xlabel('Neighborhood names')
plt.ylabel('Counts')
```

[16]:
```
Text(0, 0.5, 'Counts')
```



[17]:
```
#From the graph we can see that De Baarsjes / Oud West has the most count or is␣
 ↪the
#most popular.
#Westpoort has the least count or the least popularity.
```

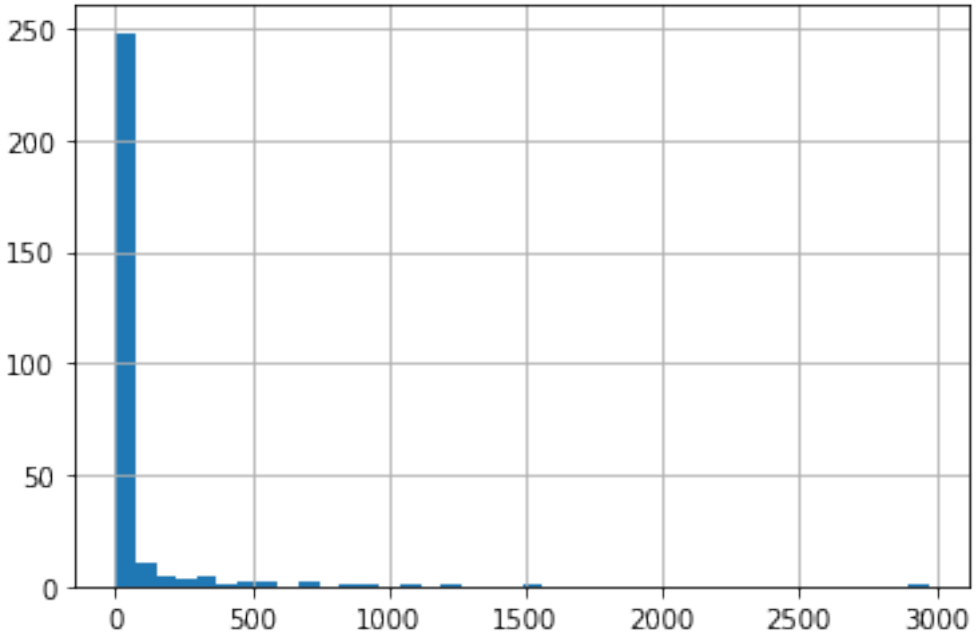
[18]:
```
dataset['reviews'].value_counts()
```

[18]:
```
0      2973
1      1504
2      1240
3      1099
4       924
      ...
191       1
334       1
309       1
235       1
188       1
Name: reviews, Length: 283, dtype: int64
```

[19]:
```
reviews_count=pd.Series(dataset['reviews'].value_counts())
pd.set_option("display.max_rows",None,"display.max_columns",None)
#print(reviews_count)
```

[20]:
```
#plotting histogram for showing count for each review.
reviews_count.hist(bins=40)
```

[20]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f942c996e80>
```



[21]:
```
#from the above data and histogram we find that count of reviews 0 to 20 are
#comparatively higher than other values.
```

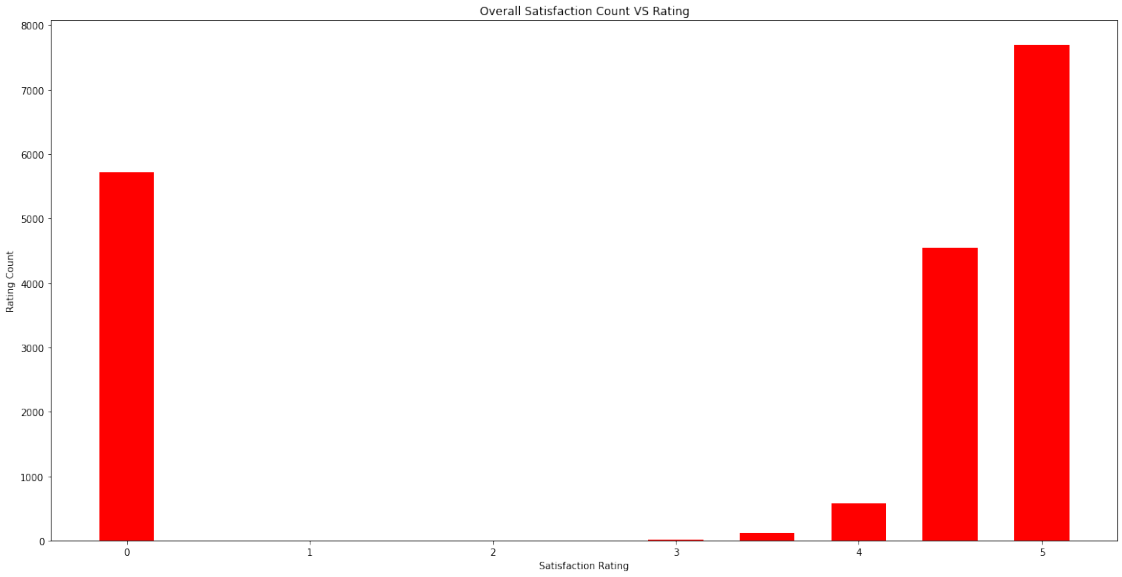
[22]:
```
dataset['overall_satisfaction'].value_counts()
```

[22]:
```
5.0    7693
0.0    5725
4.5    4546
4.0     576
3.5     109
3.0      19
1.5       1
2.5       1
1.0       1
Name: overall_satisfaction, dtype: int64
```

[23]:
```
#from above we get the overall satisfaction count w.r.to ratings.
```

[24]:
```
fig=plt.figure(figsize=[20,10])
plt.bar(dataset['overall_satisfaction'].value_counts().
  ↪index,dataset['overall_satisfaction'].value_counts().
  ↪to_list(),color='red',width=0.3)
plt.xlabel('Satisfaction Rating')
plt.ylabel('Rating Count')
plt.title("Overall Satisfaction Count VS Rating")
```

[24]:
```
Text(0.5, 1.0, 'Overall Satisfaction Count VS Rating')
```



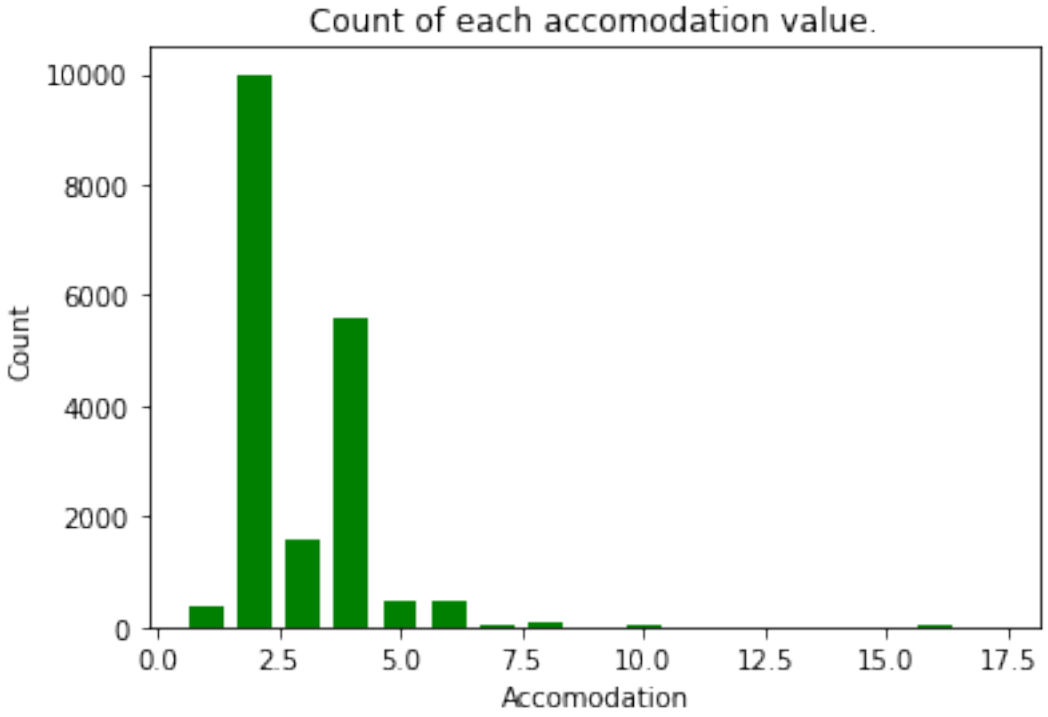
[25]:
```
#from the dataset and graph above we find that Satisfaction rating 5.0 has the
#maximum count i.e. a large community of people are satisfied by the services
#provided by Airbnb.
```

[26]:
```
#count of accomodation values
accomodation_counts=dataset['accommodates'].value_counts()
accomodation_counts
```

[26]:
```
2     9991
4     5571
3     1579
6      473
5      471
1      365
8      105
7       52
16      20
10      16
```

```
12      10
9        8
14       6
11       2
13       1
17       1
Name: accommodates, dtype: int64
```

[27]:
```
size=accomodation_counts.to_list()
labels=accomodation_counts.index
plt.bar(labels,size,width=0.7,color='green')
plt.xlabel("Accomodation")
plt.ylabel("Count")
plt.title("Count of each accomodation value.")
plt.show()
```



[28]:
```
#from above we can see that the most available accomodations are 2 and 4.
```

[29]:
```
#most properties available.
most_prop_available=dataset['price'].value_counts()
#print(most_prop_available)
```

[30]:
```
graph={'Price':most_prop_available.index.to_list(),'Properties Available':
 ↪most_prop_available.to_list()}
most_prop_available_df=pd.DataFrame(graph)
#most_prop_available_df
```

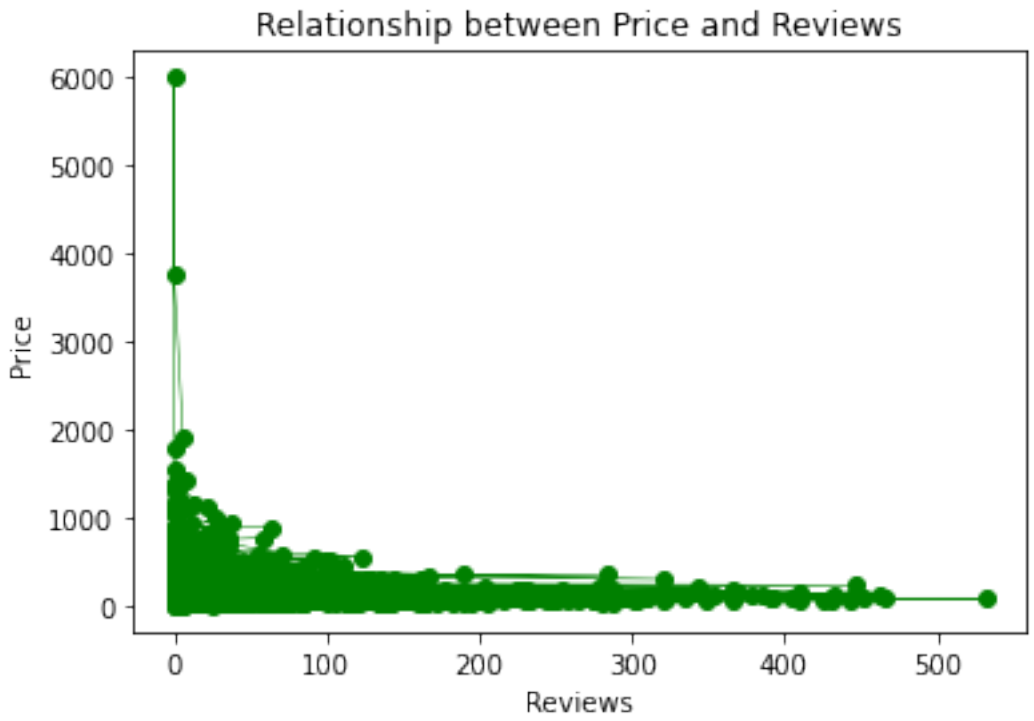
[31]:
```
#from the dataframe above we can conclude that price = 180 has the maximimum␣
 ↪properties.
```

[32]:
```
#info of dataset
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 18671 entries, 0 to 18722
Data columns (total 16 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   room_id               18671 non-null  int64
 1   survey_id             18671 non-null  int64
 2   host_id               18671 non-null  int64
 3   room_type             18671 non-null  object
 4   city                  18671 non-null  object
 5   neighborhood          18671 non-null  object
 6   reviews               18671 non-null  int64
 7   overall_satisfaction  18671 non-null  float64
 8   accommodates          18671 non-null  int64
 9   bedrooms              18671 non-null  float64
 10  price                 18671 non-null  float64
 11  name                  18671 non-null  object
 12  last_modified         18671 non-null  object
 13  latitude              18671 non-null  float64
 14  longitude             18671 non-null  float64
 15  location              18671 non-null  object
dtypes: float64(5), int64(5), object(6)
memory usage: 2.4+ MB
```

[33]:
```
#checking relationship between price and reviews.
plt.plot(dataset['reviews'],dataset['price'],marker='o',c='green',linewidth=0.5)
plt.xlabel("Reviews")
plt.ylabel("Price")
plt.title("Relationship between Price and Reviews")
```

[33]:
```
Text(0.5, 1.0, 'Relationship between Price and Reviews')
```



[34]:
```
#finding correlation
from scipy.stats import pearsonr
correlation,_=pearsonr(dataset['reviews'],dataset['price'])
print('Pearson Correlation: %3f'%correlation)
```

```
Pearson Correlation: -0.084839
```

[35]:
```
#we find negative trend relationship between price and reviews.
#so,if no. of reviews increase then prices will decrease.
```

[36]:
```
dataset.columns
```

[36]:
```
Index(['room_id', 'survey_id', 'host_id', 'room_type', 'city', 'neighborhood',
       'reviews', 'overall_satisfaction', 'accommodates', 'bedrooms', 'price',
       'name', 'last_modified', 'latitude', 'longitude', 'location'],
      dtype='object')
```

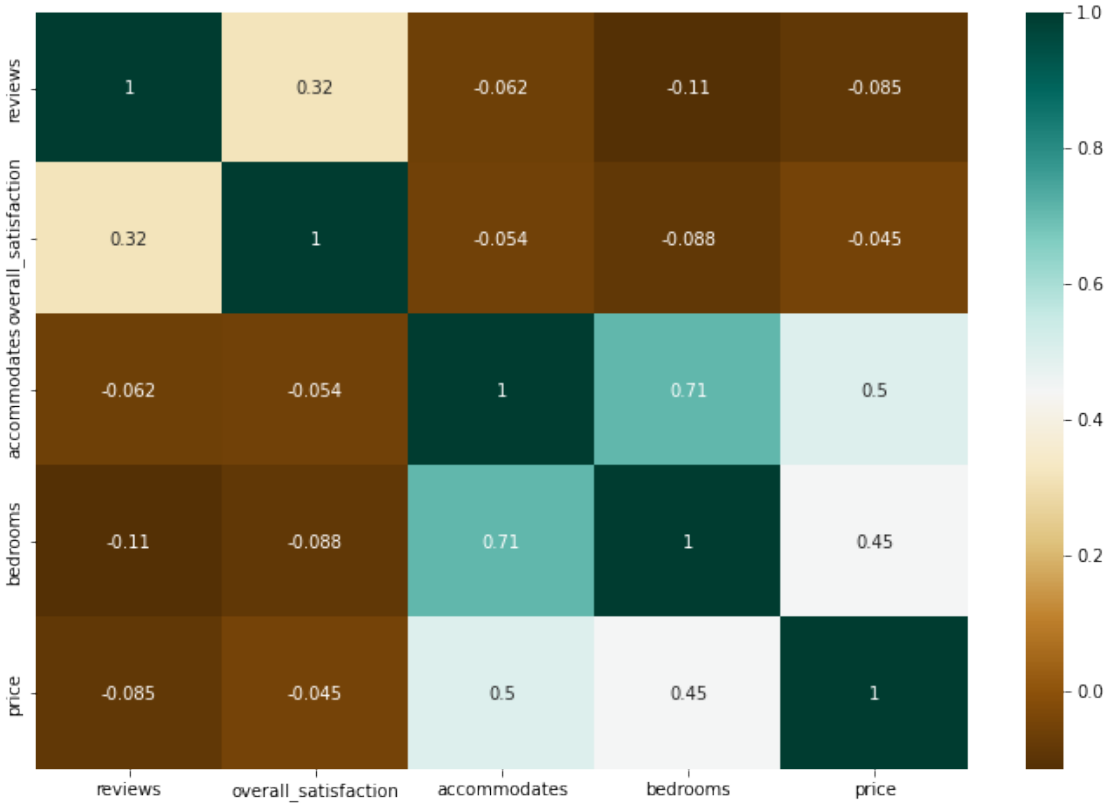
[37]:
```
df=dataset[['reviews', 'overall_satisfaction', 'accommodates', 'bedrooms',␣
 ↪'price']]
correlation=df.corr()
print(correlation)
```

```
                     reviews  overall_satisfaction  accommodates  bedrooms  \
reviews             1.000000              0.316649     -0.061713 -0.114480
```

```
overall_satisfaction  0.316649              1.000000     -0.054160 -0.087913
accommodates         -0.061713             -0.054160      1.000000  0.710973
bedrooms             -0.114480             -0.087913      0.710973  1.000000
price                -0.084839             -0.045055      0.500239  0.445950

                          price
reviews               -0.084839
overall_satisfaction  -0.045055
accommodates           0.500239
bedrooms               0.445950
price                  1.000000
```

[38]:
```
plt.figure(figsize=(12,8))
sns.heatmap(correlation,cmap = 'BrBG', annot = True)
plt.show()
```

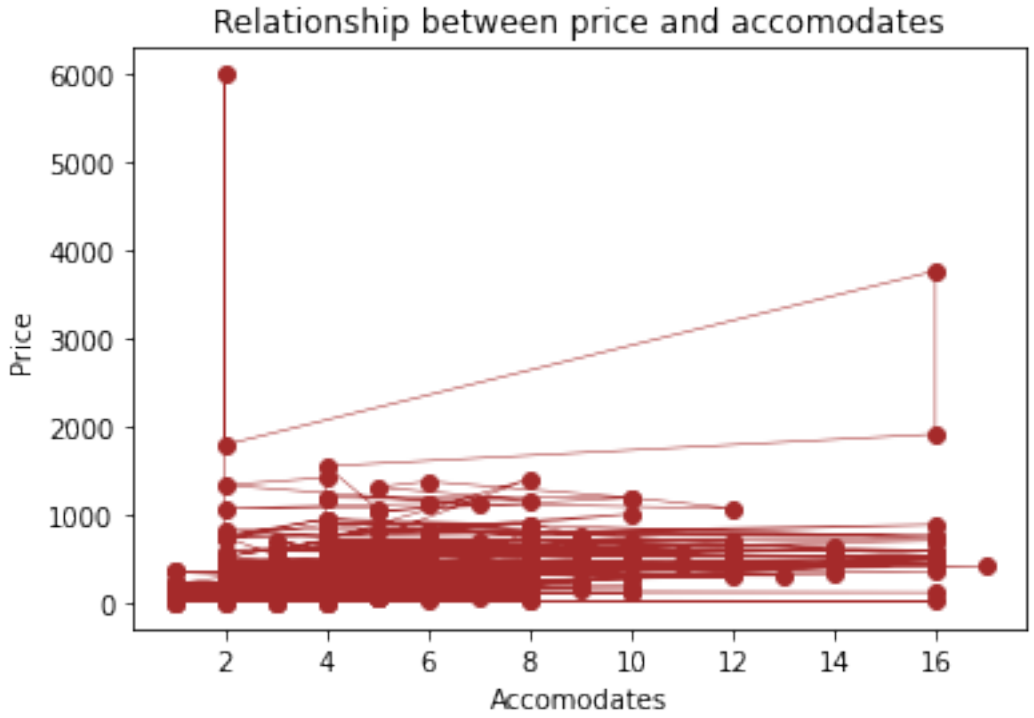


[39]:
```
#above is a heatmap showing correlation between different attributes of the␣
↪dataset.
```

[40]:
```
#checking relationship between price and accomodates.
```

```
plt.
  ↪plot(dataset['accommodates'],dataset['price'],marker='o',c='brown',linewidth=0.
  ↪5)
plt.xlabel("Accomodates")
plt.ylabel("Price")
plt.title("Relationship between price and accomodates")
```

[40]: Text(0.5, 1.0, 'Relationship between price and accomodates')



[41]:
```
#finding correlation by Pearson coefficient.
correlation,_=pearsonr(dataset['accommodates'],dataset['price'])
print('Pearson correlation: %3f' % correlation)
```

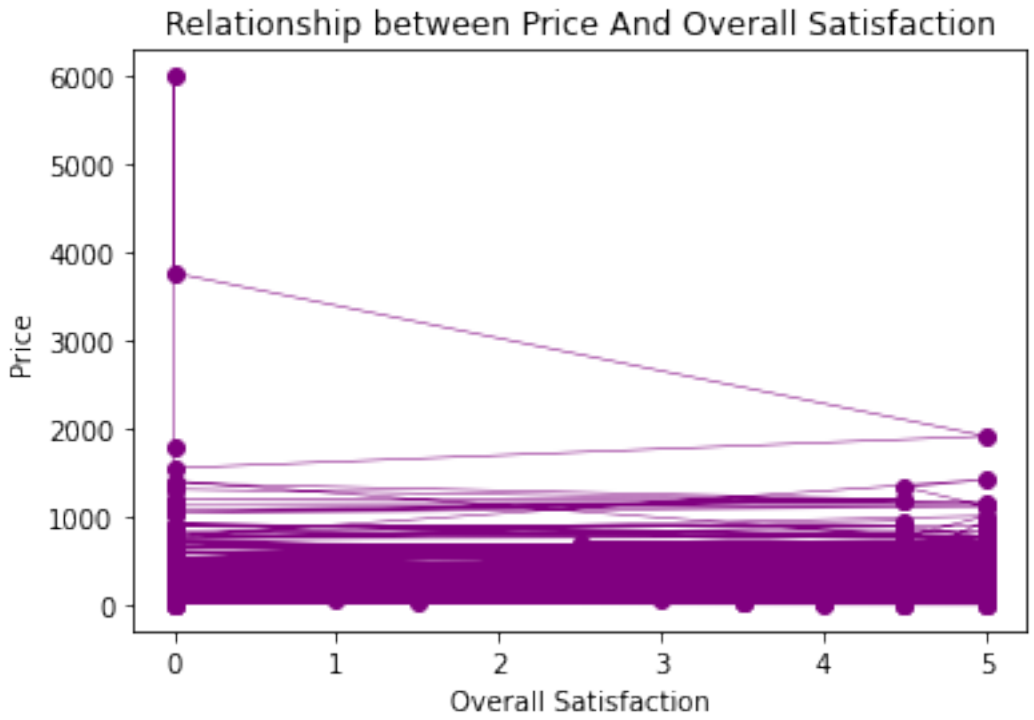
```
Pearson correlation: 0.500239
```

[42]:
```
#from the above graph and correlation value we find that there is slightly␣
  ↪positive
#or weak positive correlation or relationship between price and accomodates.
#if no. of accomodates increase then price will also increase.
```

[43]:
```
#finding relationship between price and Overall Satisfaction
```

```
plt.
  ↪plot(dataset['overall_satisfaction'],dataset['price'],marker='o',c='purple',linewidth=0.
  ↪5)
plt.xlabel("Overall Satisfaction")
plt.ylabel("Price")
plt.title("Relationship between Price And Overall Satisfaction")
```

[43]:
```
Text(0.5, 1.0, 'Relationship between Price And Overall Satisfaction')
```



[44]:
```
#correlation by Pearson correlation coefficient
correlation,_=pearsonr(dataset['overall_satisfaction'],dataset['price'])
print('Pearson Correlation: %3f' % correlation)
```

```
Pearson Correlation: -0.045055
```

[45]:
```
#from above graph and correlation value we see that there is negative linear
#relationship between overall_satisfaction and price.
#if overall satisfaction increases then price will decrease.
```

[46]:
```
#dataset['bedrooms']
```

[47]:
```
#share of different bedroom values int total bedroom value.
bedroom_count=dataset['bedrooms'].value_counts()
```

```
Totalbedrooms=bedroom_count.sum()
data={'Bedroom_values':bedroom_count.index.to_list(),'Share/Proportion':
 ↪bedroom_count.to_list()}
bedroom_count_df=pd.DataFrame(data)
print("Total no. of Bedrooms available : ",Totalbedrooms)
print(dataset.shape)
```

```
Total no. of Bedrooms available :  18671
(18671, 16)
```

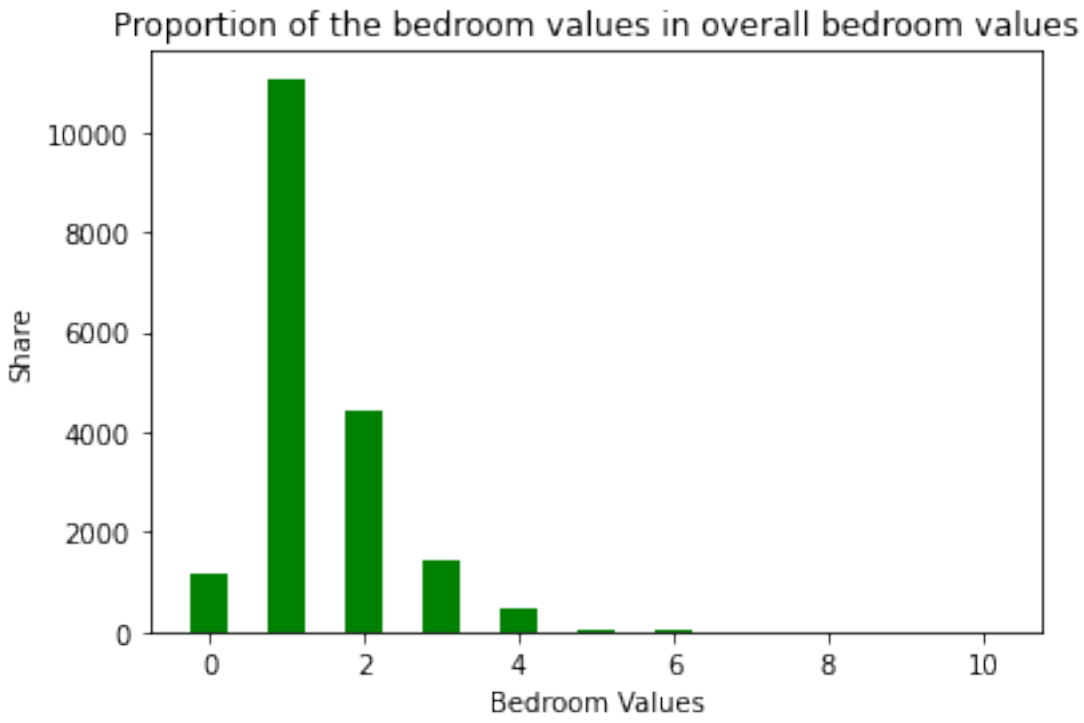
[48]:
```
print("Each bedroom's share : ")
bedroom_count_df
```

```
Each bedroom's share :
```

[48]:

	Bedroom_values	Share/Proportion
0	1.0	11068
1	2.0	4446
2	3.0	1442
3	0.0	1148
4	4.0	472
5	5.0	62
6	6.0	19
7	10.0	5
8	7.0	4
9	8.0	3
10	9.0	2

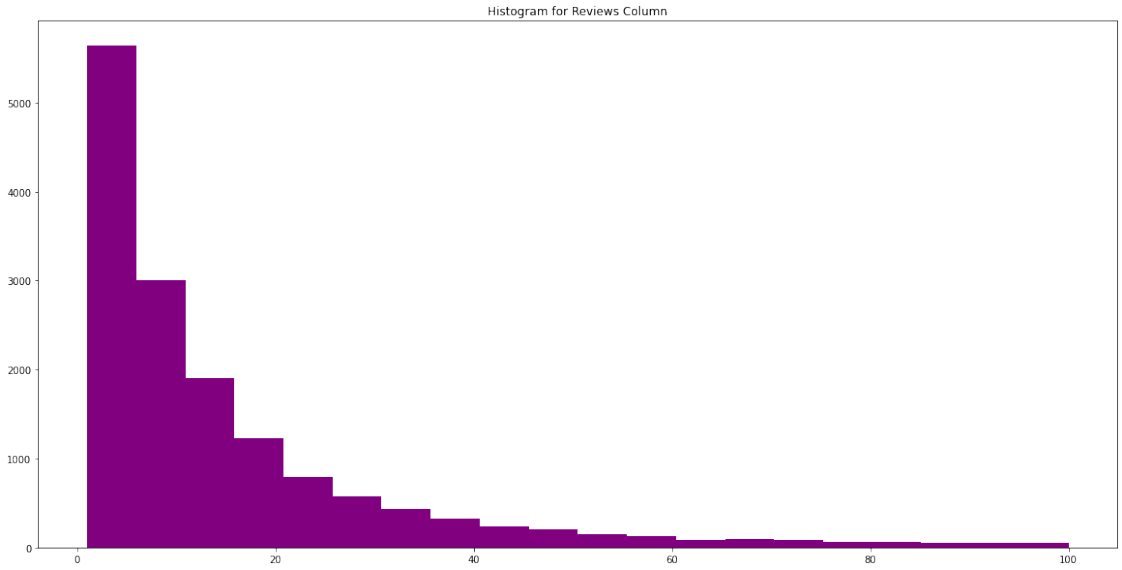
[49]:
```
sizes=bedroom_count.to_list()
labels=bedroom_count.index.to_list()
plt.bar(labels,sizes,width=0.5,color='green')
plt.xlabel("Bedroom Values")
plt.ylabel("Share")
plt.title("Proportion of the bedroom values in overall bedroom values")
plt.show()
```



[50]:
```
#It is clear from graph above that bedroom values 1 and 2 have the most share␣
↪in overall bedroom values.
```

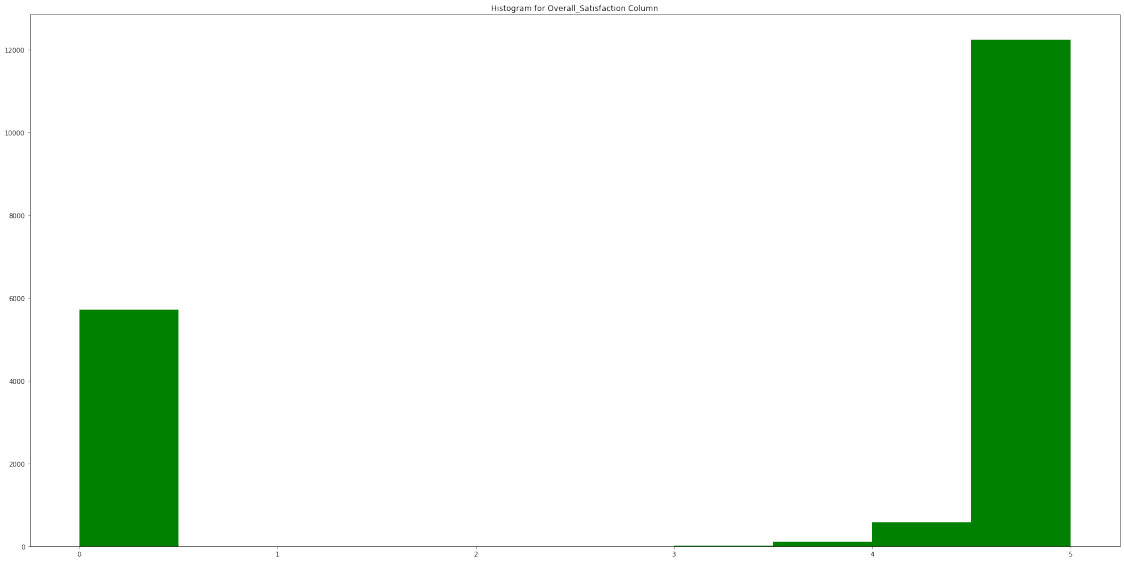
[51]:
```
#Histogram plot of reviews column.
fig=plt.figure(figsize=[20,10])
plt.hist('reviews',bins=20,range=(1,100),data=dataset,color='purple')
plt.title("Histogram for Reviews Column")
```

[51]:
```
Text(0.5, 1.0, 'Histogram for Reviews Column')
```



[52]:
```
#Histogram plot of overall_satisfaction column.
fig=plt.figure(figsize=[30,15])
plt.hist('overall_satisfaction',bins=10,data=dataset,color='green')
plt.title('Histogram for Overall_Satisfaction Column')
```

[52]: Text(0.5, 1.0, 'Histogram for Overall_Satisfaction Column')



[52]: