Python_Data_Analyst_Project

October 12, 2024

1 AtliQ Hotels Data Analysis Project

Importing pandas as a module

```
[1]: import pandas as pd
```

2 1.Data Importation and exploration to understand the datasets

Importing CSV files in Data Frames using pandas module

```
[2]: df_bookings=pd.read_csv('fact_bookings.csv')
     df_date=pd.read_csv('dim_date.csv')
     df_rooms=pd.read_csv('dim_rooms.csv')
     df_agg_bookings=pd.read_csv('fact_aggregated_bookings.csv')
     df_hotels=pd.read_csv('dim_hotels.csv')
```

Now lets view each data frame and understand each dataframe and its significance

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

```
[3]:          booking_id  property_id booking_date check_in_date checkout_date  \
     0  May012216558RT11        16558     27-04-22      1/5/2022      2/5/2022
     1  May012216558RT12        16558     30-04-22      1/5/2022      2/5/2022
     2  May012216558RT13        16558     28-04-22      1/5/2022      4/5/2022
     3  May012216558RT14        16558     28-04-22      1/5/2022      2/5/2022
     4  May012216558RT15        16558     27-04-22      1/5/2022      2/5/2022

        no_guests room_category booking_platform  ratings_given booking_status  \
     0       -3.0           RT1    direct online            1.0    Checked Out
     1        2.0           RT1           others            NaN      Cancelled
     2        2.0           RT1          logtrip            5.0    Checked Out
     3       -2.0           RT1           others            NaN      Cancelled
     4        4.0           RT1    direct online            5.0    Checked Out

        revenue_generated  revenue_realized
     0              10010             10010
     1               9100              3640
     2            9100000              9100
```

```
3              9100             3640
4             10920            10920
```

[4]:
```
df_bookings.revenue_realized.max()
```

[4]:
```
45220
```

Now lets check how many rows and columns are there in the above data frame

[5]:
```
df_bookings.shape
```

[5]:
```
(134590, 12)
```

134590 rows and 12 columns

Just by displaying the dataframe itself we found a error such as no_guests has negative values. Other thing is that if a booking is cancelled that means a specific amount is refunded to the customer and other specific amount is taken by the hotel as a penalty thats why there is a difference between the revenue_generated and revenue_realized in the records whos bookind_status is cancelled.

3 Now lets do some exploratory tasks

[6]:
```
df_bookings.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 134590 entries, 0 to 134589
Data columns (total 12 columns):
 #   Column             Non-Null Count   Dtype
---  ------             --------------   -----
 0   booking_id         134590 non-null  object
 1   property_id        134590 non-null  int64
 2   booking_date       134590 non-null  object
 3   check_in_date      134590 non-null  object
 4   checkout_date      134590 non-null  object
 5   no_guests          134587 non-null  float64
 6   room_category      134590 non-null  object
 7   booking_platform   134590 non-null  object
 8   ratings_given      56683 non-null   float64
 9   booking_status     134590 non-null  object
 10  revenue_generated  134590 non-null  int64
 11  revenue_realized   134590 non-null  int64
dtypes: float64(2), int64(3), object(7)
memory usage: 12.3+ MB
```

Here We can see that the columns containing dates are object which we might need to convert to datetime format in future for analysis

[7]:
```
df_bookings.room_category.unique()
```

```
[7]: array(['RT1', 'RT2', 'RT3', 'RT4'], dtype=object)
```

4 We can now know the number of bookings through each platform

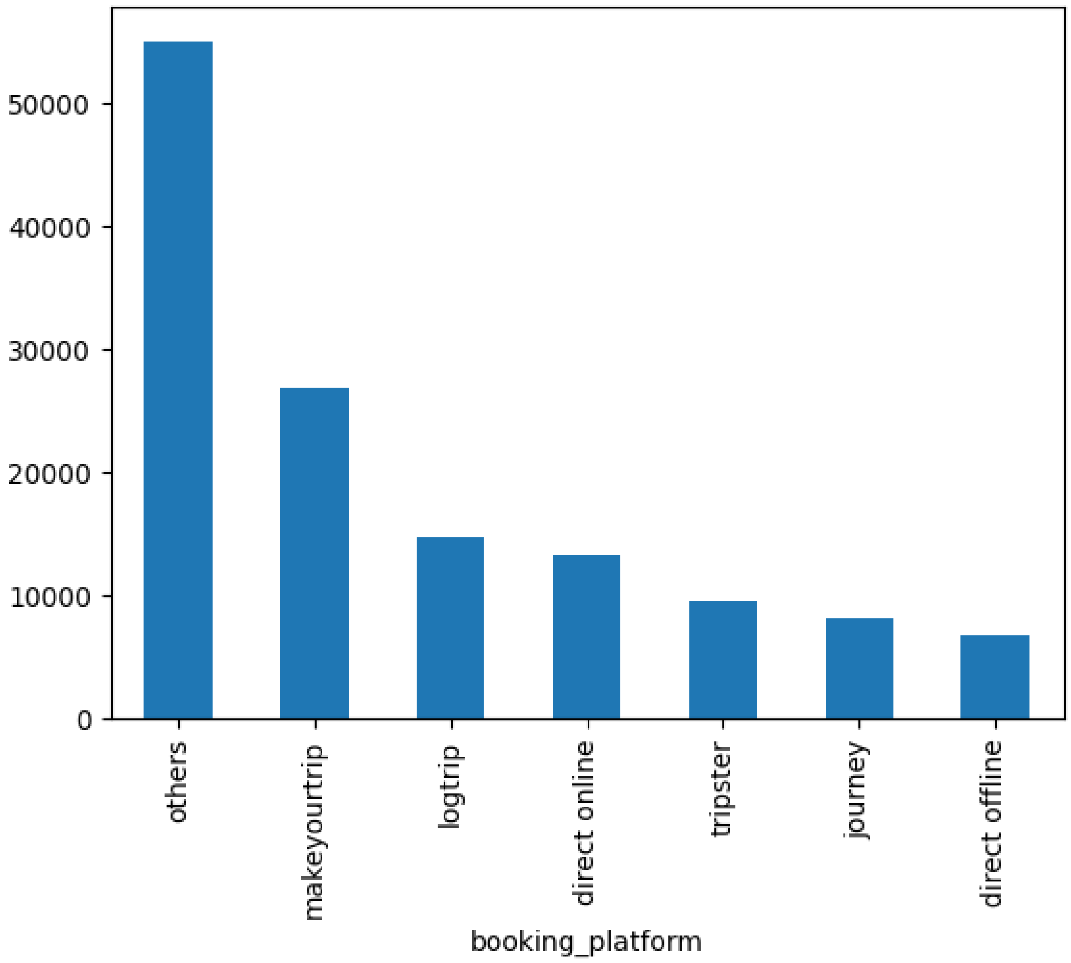
```
[8]: df_bookings.booking_platform.value_counts()
```

```
[8]: booking_platform
     others            55066
     makeyourtrip      26898
     logtrip           14756
     direct online     13379
     tripster           9630
     journey            8106
     direct offline     6755
     Name: count, dtype: int64
```

We will now plot a simple bar chart for better understanding

```
[9]: df_bookings.booking_platform.value_counts().plot(kind="bar")
```

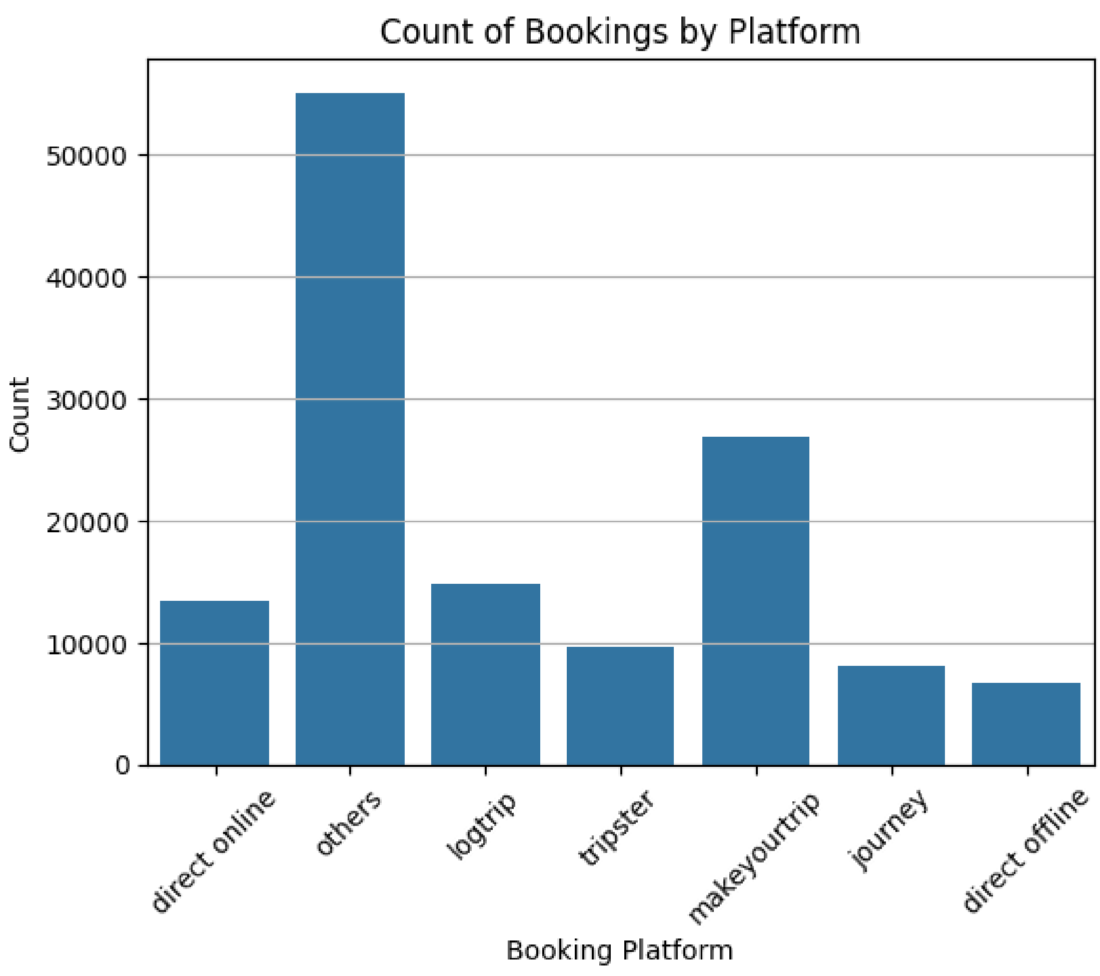
```
[9]: <Axes: xlabel='booking_platform'>
```



5 Same visualization using Seaborn and Matplotlib library

[10]:
```python
import seaborn as sns
import matplotlib.pyplot as plt
```

[11]:
```python
# Create a count plot using Seaborn
sns.countplot(x='booking_platform',data=df_bookings)
plt.title('Count of Bookings by Platform')# Add a title
plt.xlabel('Booking Platform')# Label for x-axis
plt.ylabel('Count')# Label for y-axis
plt.xticks(rotation=45)# Rotate x-axis labels for better readability
plt.grid(axis='y')# Add grid lines for y-axis
```



As Seaborn is build on top of Matplotlib,its better to use it together by creating plot using seaborn and modifying using Matplotlib.

[12]:
```
df_bookings.describe()
```

[12]:
```
         property_id      no_guests  ratings_given  revenue_generated  \
count  134590.000000  134587.000000   56683.000000       1.345900e+05
mean    18061.113493       2.036170       3.619004       1.537805e+04
std      1093.055847       1.034885       1.235009       9.303604e+04
min     16558.000000     -17.000000       1.000000       6.500000e+03
25%     17558.000000       1.000000       3.000000       9.900000e+03
50%     17564.000000       2.000000       4.000000       1.350000e+04
75%     18563.000000       2.000000       5.000000       1.800000e+04
max     19563.000000       6.000000       5.000000       2.856000e+07

       revenue_realized
count     134590.000000
```

```
mean      12696.123256
std        6928.108124
min        2600.000000
25%        7600.000000
50%       11700.000000
75%       15300.000000
max       45220.000000
```

As by using describe function we now get common metrics of the dataframe.As we can see the number of guest has negative values.Which we will clean in the cleaning process.Also we would check for the maximum value in revenue_realized, if it is true or wrong answer.

[13]:
```
df_bookings.isnull().sum()
```

[13]:
```
booking_id                0
property_id               0
booking_date              0
check_in_date             0
checkout_date             0
no_guests                 3
room_category             0
booking_platform          0
ratings_given         77907
booking_status            0
revenue_generated         0
revenue_realized          0
dtype: int64
```

As we display the null values we got to know that not all customers have left a review after their visit which is understandable.

Now we check for the unique values in dataframe to check if there is any abnormality in the data entered

[14]:
```
df_bookings.property_id.unique()
```

[14]:
```
array([16558, 16559, 16560, 16561, 16562, 16563, 17558, 17559, 17560,
       17561, 17562, 17563, 18558, 18559, 18560, 18561, 18562, 18563,
       19558, 19559, 19560, 19561, 19562, 19563, 17564], dtype=int64)
```

[15]:
```
df_bookings.no_guests.unique()
```

[15]:
```
array([ -3.,   2.,  -2.,   4.,   1.,   3.,  nan,   6.,   5., -10., -12.,
        -6.,  -4., -17.,  -1.])
```

[16]:
```
df_bookings.ratings_given.unique()
```

[16]:
```
array([ 1., nan,  5.,  4.,  3.,  2.])
```

```
[17]: df_bookings.revenue_generated.unique()
```

```
[17]: array([   10010,     9100,  9100000,    10920,    12600,    13860,
            15120,    18480,    20160,    16800,    26600,    11050,
            12155,    13260,    16830,    15300,    18360,    20400,
         28560000,    22440,    28560,    38760,    32300,    45220,
            35530,    41990,    21840,    34580,    23520,    29260,
            31920, 12600000,    24480,  2000000,    26520,     7150,
             6500,     7800,     9000,     9900,    10800,    12000,
            13200,    19000,    20900,    22800,    24700,    14400,
            15600,     9750,    11700,    10725,    13500,    14850,
            16200,    18000,    19800,    23400,    28500,    25200,
            34200,    39900,    31350,    21600,    37240,    37050,
         10000000], dtype=int64)
```

```
[18]: df_bookings.revenue_realized.unique()
```

```
[18]: array([10010,  3640,  9100, 10920, 12600,  5544,  5040, 15120,  6048,
         13860, 18480, 20160, 16800, 10640, 26600, 11050,  4420, 12155,
          4862,  5304, 13260, 16830, 15300,  7344, 18360,  6120,  8160,
         28560,  8976, 22440, 20400, 11424, 38760, 12920, 45220, 32300,
         35530, 41990, 15504,  4004,  8736,  6720, 34580,  7392,  9408,
         11704, 13832, 12768, 21840, 29260,  6732,  9792, 10608, 24480,
         26520,  7150,  6500,  2600,  7800,  9000,  9900, 10800,  3600,
          4800, 13200, 12000,  5280, 19000, 20900, 22800, 24700,  9120,
          7600,  3960,  4320, 14400,  2860,  3120,  8360, 15600,  9880,
          9750, 11700,  3900, 10725,  4680, 13500,  5400, 14850, 16200,
         18000,  7200,  7920,  9360, 19800, 28500,  4290,  5940, 25200,
          6480, 23400, 11400, 34200, 39900, 31350, 21600, 15960,  4368,
         14212, 23520, 37240, 31920,  8064,  5760,  8640, 10080, 18088,
          6240, 37050, 14820, 16796, 14896, 13680, 12540], dtype=int64)
```

```
[19]: df_bookings.check_in_date.unique()
```

```
[19]: array(['1/5/2022', '2/5/2022', '3/5/2022', '4/5/2022', '5/5/2022',
         '6/5/2022', '7/5/2022', '8/5/2022', '9/5/2022', '10/5/2022',
         '11/5/2022', '12/5/2022', '13-05-22', '14-05-22', '15-05-22',
         '16-05-22', '17-05-22', '18-05-22', '19-05-22', '20-05-22',
         '21-05-22', '22-05-22', '23-05-22', '24-05-22', '25-05-22',
         '26-05-22', '27-05-22', '28-05-22', '29-05-22', '30-05-22',
         '31-05-22', '1/6/2022', '2/6/2022', '3/6/2022', '4/6/2022',
         '5/6/2022', '6/6/2022', '7/6/2022', '8/6/2022', '9/6/2022',
         '10/6/2022', '11/6/2022', '12/6/2022', '13-06-22', '14-06-22',
         '15-06-22', '16-06-22', '17-06-22', '18-06-22', '19-06-22',
         '20-06-22', '21-06-22', '22-06-22', '23-06-22', '24-06-22',
         '25-06-22', '26-06-22', '27-06-22', '28-06-22', '29-06-22',
         '30-06-22', '1/7/2022', '2/7/2022', '3/7/2022', '4/7/2022',
         '5/7/2022', '6/7/2022', '7/7/2022', '8/7/2022', '9/7/2022',
         '10/7/2022', '11/7/2022', '12/7/2022', '13-07-22', '14-07-22',
         '15-07-22', '16-07-22', '17-07-22', '18-07-22', '19-07-22',
         '20-07-22', '21-07-22', '22-07-22', '23-07-22', '24-07-22',
         '25-07-22', '26-07-22', '27-07-22', '28-07-22', '29-07-22',
         '30-07-22', '31-07-22'], dtype=object)
```

[20]:
```
df_bookings.check_in_date.nunique()
```

[20]:
```
92
```

6 Now lets explore other dataframes

[21]:
```
df_date.head()
```

[21]:
```
        date  mmm yy week no  day_type
0  01-May-22  May 22    W 19   weekend
1  02-May-22  May 22    W 19  weekeday
2  03-May-22  May 22    W 19  weekeday
3  04-May-22  May 22    W 19  weekeday
4  05-May-22  May 22    W 19  weekeday
```

[22]:
```
df_date.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 92 entries, 0 to 91
Data columns (total 4 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   date      92 non-null     object
 1   mmm yy    92 non-null     object
 2   week no   92 non-null     object
 3   day_type  92 non-null     object
dtypes: object(4)
memory usage: 3.0+ KB
```

Here also the column containing dates are in object format which we might need to change to time format in future.

[23]:
```
df_date.shape
```

[23]:
```
(92, 4)
```

[24]:
```
df_date.isnull().sum()
```

[24]:
```
date        0
mmm yy      0
week no     0
```

```
day_type    0
dtype: int64
```

[25]:
```
df_date.describe()
```

[25]:
```
             date  mmm yy week no  day_type
count          92      92      92        92
unique         92       3      14         2
top     01-May-22  May 22    W 19  weekeday
freq            1      31       7        65
```

[26]:
```
df_date.date.unique()
```

[26]:
```
array(['01-May-22', '02-May-22', '03-May-22', '04-May-22', '05-May-22',
       '06-May-22', '07-May-22', '08-May-22', '09-May-22', '10-May-22',
       '11-May-22', '12-May-22', '13-May-22', '14-May-22', '15-May-22',
       '16-May-22', '17-May-22', '18-May-22', '19-May-22', '20-May-22',
       '21-May-22', '22-May-22', '23-May-22', '24-May-22', '25-May-22',
       '26-May-22', '27-May-22', '28-May-22', '29-May-22', '30-May-22',
       '31-May-22', '01-Jun-22', '02-Jun-22', '03-Jun-22', '04-Jun-22',
       '05-Jun-22', '06-Jun-22', '07-Jun-22', '08-Jun-22', '09-Jun-22',
       '10-Jun-22', '11-Jun-22', '12-Jun-22', '13-Jun-22', '14-Jun-22',
       '15-Jun-22', '16-Jun-22', '17-Jun-22', '18-Jun-22', '19-Jun-22',
       '20-Jun-22', '21-Jun-22', '22-Jun-22', '23-Jun-22', '24-Jun-22',
       '25-Jun-22', '26-Jun-22', '27-Jun-22', '28-Jun-22', '29-Jun-22',
       '30-Jun-22', '01-Jul-22', '02-Jul-22', '03-Jul-22', '04-Jul-22',
       '05-Jul-22', '06-Jul-22', '07-Jul-22', '08-Jul-22', '09-Jul-22',
       '10-Jul-22', '11-Jul-22', '12-Jul-22', '13-Jul-22', '14-Jul-22',
       '15-Jul-22', '16-Jul-22', '17-Jul-22', '18-Jul-22', '19-Jul-22',
       '20-Jul-22', '21-Jul-22', '22-Jul-22', '23-Jul-22', '24-Jul-22',
       '25-Jul-22', '26-Jul-22', '27-Jul-22', '28-Jul-22', '29-Jul-22',
       '30-Jul-22', '31-Jul-22'], dtype=object)
```

[27]:
```
df_date['mmm yy'].unique()
```

[27]:
```
array(['May 22', 'Jun 22', 'Jul 22'], dtype=object)
```

[28]:
```
df_date['week no'].unique()
```

[28]:
```
array(['W 19', 'W 20', 'W 21', 'W 22', 'W 23', 'W 24', 'W 25', 'W 26',
       'W 27', 'W 28', 'W 29', 'W 30', 'W 31', 'W 32'], dtype=object)
```

[29]:
```
df_date['day_type'].unique()
```

[29]:
```
array(['weekend', 'weekeday'], dtype=object)
```

We found one more error weekeday should be weekday.

By using describe we can see all the relevent details of the dataframe.

[30]:
```
df_hotels.head()
```

[30]:
```
   property_id  property_name  category    city
0        16558   Atliq Grands    Luxury   Delhi
1        16559  Atliq Exotica    Luxury  Mumbai
2        16560     Atliq City  Business   Delhi
3        16561      Atliq Blu    Luxury   Delhi
4        16562      Atliq Bay    Luxury   Delhi
```

[31]:
```
df_hotels.shape
```

[31]:
```
(25, 4)
```

[32]:
```
df_hotels.isnull().sum()
```

[32]:
```
property_id      0
property_name    0
category         0
city             0
dtype: int64
```

[33]:
```
df_hotels.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25 entries, 0 to 24
Data columns (total 4 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   property_id    25 non-null     int64
 1   property_name  25 non-null     object
 2   category       25 non-null     object
 3   city           25 non-null     object
dtypes: int64(1), object(3)
memory usage: 928.0+ bytes
```

[34]:
```
df_hotels.describe()
```

[34]:
```
        property_id
count     25.000000
mean   18040.640000
std     1122.436371
min    16558.000000
25%    17558.000000
50%    17564.000000
75%    18563.000000
max    19563.000000
```

[35]:
```
df_hotels.property_id.unique()
```

```
[35]: array([16558, 16559, 16560, 16561, 16562, 16563, 17558, 17559, 17560,
              17561, 17562, 17563, 18558, 18559, 18560, 18561, 18562, 18563,
              19558, 19559, 19560, 19561, 19562, 19563, 17564], dtype=int64)
```

```
[36]: df_hotels.property_name.unique()
```

```
[36]: array(['Atliq Grands', 'Atliq Exotica', 'Atliq City', 'Atliq Blu',
              'Atliq Bay', 'Atliq Palace', 'Atliq Seasons'], dtype=object)
```

```
[37]: df_hotels.category.unique()
```

```
[37]: array(['Luxury', 'Business'], dtype=object)
```

```
[38]: df_hotels.city.unique()
```

```
[38]: array(['Delhi', 'Mumbai', 'Hyderabad', 'Bangalore'], dtype=object)
```

```
[39]: df_rooms
```

```
[39]:   room_id    room_class
      0     RT1      Standard
      1     RT2         Elite
      2     RT3       Premium
      3     RT4  Presidential
```

```
[40]: df_agg_bookings
```

```
[40]:       property_id check_in_date room_category  successful_bookings  capacity
      0          16559      1-May-22           RT1                   25      30.0
      1          19562      1-May-22           RT1                   28      30.0
      2          19563      1-May-22           RT1                   23      30.0
      3          17558      1-May-22           RT1                   30      19.0
      4          16558      1-May-22           RT1                   18      19.0
      …            …            …            …                   …        …
      9195       16563     31-Jul-22           RT4                   13      18.0
      9196       16559     31-Jul-22           RT4                   13      18.0
      9197       17558     31-Jul-22           RT4                    3       6.0
      9198       19563     31-Jul-22           RT4                    3       6.0
      9199       17561     31-Jul-22           RT4                    3       4.0

       [9200 rows x 5 columns]
```

```
[41]: df_agg_bookings.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9200 entries, 0 to 9199
Data columns (total 5 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
```

```
 0   property_id          9200 non-null   int64
 1   check_in_date        9200 non-null   object
 2   room_category        9200 non-null   object
 3   successful_bookings  9200 non-null   int64
 4   capacity             9198 non-null   float64
dtypes: float64(1), int64(2), object(2)
memory usage: 359.5+ KB
```

[42]:
```
df_agg_bookings.describe()
```

[42]:
```
        property_id  successful_bookings     capacity
count   9200.000000          9200.000000  9198.000000
mean   18040.640000            14.655761    25.280496
std     1099.818325             7.736170    11.442080
min    16558.000000             1.000000     3.000000
25%    17558.000000             9.000000    18.000000
50%    17564.000000            14.000000    25.000000
75%    18563.000000            19.000000    34.000000
max    19563.000000           123.000000    50.000000
```

[43]:
```
df_agg_bookings.isnull().sum()
```

[43]:
```
property_id            0
check_in_date          0
room_category          0
successful_bookings    0
capacity               2
dtype: int64
```

So in capacity we got two enteries as null.

As we have found out earlier that the null values are present in the capacity column in the dataframe we now display them real quick and drop those entries as they serve no purpose.As it is not found in any other dataframe.

[44]:
```
df_agg_bookings.property_id.unique()
```

[44]:
```
array([16559, 19562, 19563, 17558, 16558, 17560, 19558, 19560, 17561,
       16560, 16561, 16562, 16563, 17559, 17562, 17563, 18558, 18559,
       18561, 18562, 18563, 19559, 19561, 17564, 18560], dtype=int64)
```

[45]:
```
df_agg_bookings.check_in_date.unique()
```

[45]:
```
array(['1-May-22', '2-May-22', '3-May-22', '4-May-22', '5-May-22',
       '6-May-22', '7-May-22', '8-May-22', '9-May-22', '10-May-22',
       '11-May-22', '12-May-22', '13-May-22', '14-May-22', '15-May-22',
       '16-May-22', '17-May-22', '18-May-22', '19-May-22', '20-May-22',
       '21-May-22', '22-May-22', '23-May-22', '24-May-22', '25-May-22',
       '26-May-22', '27-May-22', '28-May-22', '29-May-22', '30-May-22',
       '31-May-22', '1-Jun-22', '2-Jun-22', '3-Jun-22', '4-Jun-22',
       '5-Jun-22', '6-Jun-22', '7-Jun-22', '8-Jun-22', '9-Jun-22',
       '10-Jun-22', '11-Jun-22', '12-Jun-22', '13-Jun-22', '14-Jun-22',
       '15-Jun-22', '16-Jun-22', '17-Jun-22', '18-Jun-22', '19-Jun-22',
       '20-Jun-22', '21-Jun-22', '22-Jun-22', '23-Jun-22', '24-Jun-22',
       '25-Jun-22', '26-Jun-22', '27-Jun-22', '28-Jun-22', '29-Jun-22',
       '30-Jun-22', '1-Jul-22', '2-Jul-22', '3-Jul-22', '4-Jul-22',
       '5-Jul-22', '6-Jul-22', '7-Jul-22', '8-Jul-22', '9-Jul-22',
       '10-Jul-22', '11-Jul-22', '12-Jul-22', '13-Jul-22', '14-Jul-22',
       '15-Jul-22', '16-Jul-22', '17-Jul-22', '18-Jul-22', '19-Jul-22',
       '20-Jul-22', '21-Jul-22', '22-Jul-22', '23-Jul-22', '24-Jul-22',
       '25-Jul-22', '26-Jul-22', '27-Jul-22', '28-Jul-22', '29-Jul-22',
       '30-Jul-22', '31-Jul-22'], dtype=object)
```

[46]:
```
df_agg_bookings.room_category.unique()
```

[46]:
```
array(['RT1', 'RT2', 'RT3', 'RT4'], dtype=object)
```

[47]:
```
df_agg_bookings.successful_bookings.unique()
```

[47]:
```
array([ 25,  28,  23,  30,  18,  22,  24,  16,  20, 100,  26,  12,  21,
        11,  29,  31,  34,   9,  32,  38,  37,  35,  33,  40,  19,  36,
        27,  15,  17,   8,  13,  14,   2,   4,   5,   6,  10,   3,   7,
         1,  39,  50,  43,  41, 123], dtype=int64)
```

[48]:
```
df_agg_bookings.capacity.unique()
```

[48]:
```
array([30., 19., 40., 26., nan, 34., 18., 31., 41., 32., 25., 15., 42.,
       33., 38., 27., 24., 36., 16., 23., 29., 50., 43., 22., 39., 44.,
       45., 21., 20.,  8.,  3.,  6.,  7., 10., 13.,  9., 17., 14.,  4.])
```

[49]:
```
df_agg_bookings[df_agg_bookings['capacity'].isnull()]
```

[49]:
```
    property_id check_in_date room_category  successful_bookings  capacity
8         17561      1-May-22           RT1                   22       NaN
14        17562      1-May-22           RT1                   12       NaN
```

7 1.Finding out unique property ids in aggregate bookings dataset

[50]:
```
df_agg_bookings.property_id.unique()
```

[50]:
```
array([16559, 19562, 19563, 17558, 16558, 17560, 19558, 19560, 17561,
       16560, 16561, 16562, 16563, 17559, 17562, 17563, 18558, 18559,
       18561, 18562, 18563, 19559, 19561, 17564, 18560], dtype=int64)
```

8 2.Finding out total Bookings per property_id

```
[51]: df_agg_bookings.groupby("property_id")["successful_bookings"].sum()
```

```
[51]: property_id
      16558    3153
      16559    7338
      16560    4693
      16561    4418
      16562    4820
      16563    7211
      17558    5053
      17559    6142
      17560    6013
      17561    5183
      17562    3424
      17563    6337
      17564    3982
      18558    4475
      18559    5256
      18560    6638
      18561    6458
      18562    7333
      18563    4737
      19558    4400
      19559    4729
      19560    6079
      19561    5736
      19562    5812
      19563    5413
      Name: successful_bookings, dtype: int64
```

9 3.Finding out days on which bookings are greater than capacity

```
[52]: df_agg_bookings[df_agg_bookings.capacity<df_agg_bookings.successful_bookings]
```

```
[52]:       property_id check_in_date room_category  successful_bookings  capacity
      3           17558       1-May-22           RT1                   30      19.0
      12          16563       1-May-22           RT1                  100      41.0
      4136        19558      11-Jun-22           RT2                   50      39.0
      6209        19560       2-Jul-22           RT1                  123      26.0
      8522        19559      25-Jul-22           RT1                   35      24.0
      9194        18563      31-Jul-22           RT4                   20      18.0
```

10 4.Find out properties that have highest capacity

[53]:
```
n=df_agg_bookings.capacity.max()
df_agg_bookings[df_agg_bookings['capacity']==n]
```

[53]:
```
      property_id check_in_date room_category  successful_bookings  capacity
27          17558       1-May-22           RT2                   38      50.0
128         17558       2-May-22           RT2                   27      50.0
229         17558       3-May-22           RT2                   26      50.0
328         17558       4-May-22           RT2                   27      50.0
428         17558       5-May-22           RT2                   29      50.0
…             …           …           …                   …         …
8728        17558      27-Jul-22           RT2                   22      50.0
8828        17558      28-Jul-22           RT2                   21      50.0
8928        17558      29-Jul-22           RT2                   23      50.0
9028        17558      30-Jul-22           RT2                   32      50.0
9128        17558      31-Jul-22           RT2                   30      50.0

[92 rows x 5 columns]
```

The above result shows all the records of the property that has the maximum capacity.

Now if we only want to show the property we can use.

[54]:
```
df_agg_bookings[df_agg_bookings["capacity"] == n].
  ↪groupby("property_id")[['room_category','capacity']].max()
```

[54]:
```
            room_category  capacity
property_id
17558                 RT2      50.0
```

11 Data Cleaning Process

[55]:
```
df_bookings.describe()
```

[55]:
```
         property_id      no_guests  ratings_given  revenue_generated  \
count  134590.000000  134587.000000   56683.000000       1.345900e+05
mean    18061.113493       2.036170       3.619004       1.537805e+04
std      1093.055847       1.034885       1.235009       9.303604e+04
min     16558.000000     -17.000000       1.000000       6.500000e+03
25%     17558.000000       1.000000       3.000000       9.900000e+03
50%     17564.000000       2.000000       4.000000       1.350000e+04
75%     18563.000000       2.000000       5.000000       1.800000e+04
max     19563.000000       6.000000       5.000000       2.856000e+07

       revenue_realized
count     134590.000000
mean       12696.123256
```

```
std       6928.108124
min       2600.000000
25%       7600.000000
50%      11700.000000
75%      15300.000000
max      45220.000000
```

12 A.Cleaning invalid guests that means we clear out the columns that have no_guests as negative values.

[56]:
```
df_bookings[df_bookings.no_guests<=0]
```

[56]:
```
               booking_id  property_id booking_date check_in_date  \
0         May012216558RT11        16558     27-04-22      1/5/2022
3         May012216558RT14        16558     28-04-22      1/5/2022
17924     May122218559RT44        18559    12/5/2022     12/5/2022
18020     May122218561RT22        18561     8/5/2022     12/5/2022
18119    May122218562RT311        18562     5/5/2022     12/5/2022
18121    May122218562RT313        18562    10/5/2022     12/5/2022
56715     Jun082218562RT12        18562     5/6/2022      8/6/2022
119765   Jul202219560RT220        19560     19-07-22      20-07-22
134586    Jul312217564RT47        17564     30-07-22      31-07-22

       checkout_date  no_guests room_category booking_platform  ratings_given  \
0           2/5/2022       -3.0           RT1    direct online            1.0
3           2/5/2022       -2.0           RT1           others            NaN
17924       14-05-22      -10.0           RT4    direct online            NaN
18020       14-05-22      -12.0           RT2     makeyourtrip            NaN
18119       17-05-22       -6.0           RT3   direct offline            5.0
18121       17-05-22       -4.0           RT3    direct online            NaN
56715       13-06-22      -17.0           RT1           others            NaN
119765      22-07-22       -1.0           RT2           others            NaN
134586      1/8/2022       -4.0           RT4          logtrip            2.0

       booking_status  revenue_generated  revenue_realized
0         Checked Out              10010             10010
3           Cancelled               9100              3640
17924         No Show              20900             20900
18020       Cancelled               9000              3600
18119     Checked Out              16800             16800
18121       Cancelled              14400              5760
56715     Checked Out               6500              6500
119765    Checked Out              13500             13500
134586    Checked Out              38760             38760
```

[57]:
```
df_bookings['no_guests'][df_bookings['no_guests'] <= 0].count()
```

```
[57]: 9
```

We now able to get how many records have negative no of guests.

As we can see that there are few enteries with guests less than 0 value which is an invalid answer.We can use any of the various ways such as dropping those records or filling the no_guests with any other value with the use of any function such as mean or max of the positive values etc.

```
[58]: df_bookings.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 134590 entries, 0 to 134589
Data columns (total 12 columns):
 #   Column             Non-Null Count   Dtype
---  ------             --------------   -----
 0   booking_id         134590 non-null  object
 1   property_id        134590 non-null  int64
 2   booking_date       134590 non-null  object
 3   check_in_date      134590 non-null  object
 4   checkout_date      134590 non-null  object
 5   no_guests          134587 non-null  float64
 6   room_category      134590 non-null  object
 7   booking_platform   134590 non-null  object
 8   ratings_given      56683 non-null   float64
 9   booking_status     134590 non-null  object
 10  revenue_generated  134590 non-null  int64
 11  revenue_realized   134590 non-null  int64
dtypes: float64(2), int64(3), object(7)
memory usage: 12.3+ MB
```

```
[59]: def neg(g):
          if g<=0:
              return -g
          else:
              return  g
      df_bookings['no_guests']=df_bookings.apply(lambda x:neg(x['no_guests']),axis=1)
```

As there we only few Negative values we can consider it as a typo error and convert the non positive numbers into positive numbers

```
[60]: (df_bookings[df_bookings['property_id']==16558])
```

```
[60]:              booking_id  property_id booking_date check_in_date  \
      0      May012216558RT11        16558     27-04-22      1/5/2022
      1      May012216558RT12        16558     30-04-22      1/5/2022
      2      May012216558RT13        16558     28-04-22      1/5/2022
      3      May012216558RT14        16558     28-04-22      1/5/2022
      4      May012216558RT15        16558     27-04-22      1/5/2022
      …                   …          …            …             …
```

```
132973  Jul312216558RT35        16558     29-07-22      31-07-22
132974  Jul312216558RT36        16558     27-07-22      31-07-22
132975  Jul312216558RT37        16558     28-07-22      31-07-22
132976  Jul312216558RT41        16558     26-07-22      31-07-22
132977  Jul312216558RT42        16558     28-07-22      31-07-22

       checkout_date  no_guests room_category booking_platform  ratings_given  \
0           2/5/2022        3.0           RT1    direct online            1.0
1           2/5/2022        2.0           RT1           others            NaN
2           4/5/2022        2.0           RT1          logtrip            5.0
3           2/5/2022        2.0           RT1           others            NaN
4           2/5/2022        4.0           RT1    direct online            5.0
…              …         …            …               …              …
132973      5/8/2022        4.0           RT3     makeyourtrip            NaN
132974      2/8/2022        2.0           RT3           others            NaN
132975      6/8/2022        2.0           RT3    direct online            NaN
132976      1/8/2022        6.0           RT4     makeyourtrip            5.0
132977      1/8/2022        2.0           RT4     makeyourtrip            4.0

       booking_status  revenue_generated  revenue_realized
0         Checked Out              10010             10010
1           Cancelled               9100              3640
2         Checked Out            9100000              9100
3           Cancelled               9100              3640
4         Checked Out              10920             10920
…              …                 …                …
132973      Cancelled              20160              8064
132974      Cancelled              16800              6720
132975    Checked Out              16800             16800
132976    Checked Out              37240             37240
132977    Checked Out              26600             26600

[3153 rows x 12 columns]
```

We took one of the proeprty_id of the record which had a negative value in the no of guests and then print it to find out if the values have been changed or not.

def neg(n,g): if g<=0: q=df_bookings[df_bookings['property_id']==n]['no_guests'].max() return q else: return g df_bookings['no_guests']=df_bookings.apply(lambda x:neg(x['property_id'],x['no_guests']),axis=1) (df_bookings)

We can use the above code if we want to find the max of the no_guests of a property.

13 B.Outlier Removal in Revenue Generated and Revenue Realized

[61]:
```
df_bookings.describe()
```

[61]:
```
         property_id      no_guests  ratings_given  revenue_generated  \
count  134590.000000  134587.000000   56683.000000       1.345900e+05
mean    18061.113493       2.037047       3.619004       1.537805e+04
std      1093.055847       1.033158       1.235009       9.303604e+04
min     16558.000000       1.000000       1.000000       6.500000e+03
25%     17558.000000       1.000000       3.000000       9.900000e+03
50%     17564.000000       2.000000       4.000000       1.350000e+04
75%     18563.000000       2.000000       5.000000       1.800000e+04
max     19563.000000      17.000000       5.000000       2.856000e+07

       revenue_realized
count     134590.000000
mean       12696.123256
std         6928.108124
min         2600.000000
25%         7600.000000
50%        11700.000000
75%        15300.000000
max        45220.000000
```

To find out the outliers we use Z Score Method.

[62]:
```
min,max=df_bookings.revenue_generated.min(), df_bookings.revenue_generated.max()
min,max
```

[62]:
```
(6500, 28560000)
```

std stands for Standard Deviation.Standard deviation tells us how spread out are values from the mean.The std is found in such a way that each value is subracted from mean and then these values are squared and then its sum is divided by the total count.

[63]:
```
mean,std = df_bookings.revenue_generated.mean(),df_bookings.revenue_generated.
  ↪std()
mean,std
```

[63]:
```
(15378.05412734973, 93036.03867095453)
```

In this method we use a formula to find out the higher_limit.Whatever value comes after that value is considered as a outlier.Vice versa for lower_limit

[64]:
```
higher_limit=mean+3*std
higher_limit
```

[64]:
```
294486.17014021333
```

[65]:
```
lower_limit=mean-3*std
lower_limit
```

[65]:
```
-263730.06188551383
```

lets check if the revenue generated has any negative values.

[66]:
```
df_bookings[df_bookings.revenue_generated<=0]
```

[66]:
```
Empty DataFrame
Columns: [booking_id, property_id, booking_date, check_in_date, checkout_date,
no_guests, room_category, booking_platform, ratings_given, booking_status,
revenue_generated, revenue_realized]
Index: []
```

[67]:
```
df_bookings[df_bookings.revenue_generated>higher_limit]
```

[67]:
```
                booking_id  property_id booking_date check_in_date  \
2         May012216558RT13        16558     28-04-22      1/5/2022
111       May012216559RT32        16559     29-04-22      1/5/2022
315       May012216562RT22        16562     28-04-22      1/5/2022
562      May012217559RT118        17559     26-04-22      1/5/2022
129176    Jul282216562RT26        16562     21-07-22      28-07-22

       checkout_date  no_guests room_category booking_platform  ratings_given  \
2           4/5/2022        2.0           RT1         logtrip             5.0
111         2/5/2022        6.0           RT3    direct online            NaN
315         4/5/2022        2.0           RT2   direct offline            3.0
562         2/5/2022        2.0           RT1           others            NaN
129176      29-07-22        2.0           RT2    direct online            3.0

       booking_status  revenue_generated  revenue_realized
2         Checked Out            9100000              9100
111       Checked Out           28560000             28560
315       Checked Out           12600000             12600
562         Cancelled            2000000              4420
129176    Checked Out           10000000             12600
```

[68]:
```
df_rooms
```

[68]:
```
  room_id    room_class
0     RT1      Standard
1     RT2         Elite
2     RT3       Premium
3     RT4  Presidential
```

Since there is a vast difference between the revenue generated and revenue realized.And also the rooms above the higher_limit is of standard,elite,premium.And main fact is that no room would cost this much.So we remove those records.

[69]:
```
df_bookings.shape
```

[69]:
```
(134590, 12)
```

[70]:
```
df_bookings = df_bookings[df_bookings.revenue_generated<=higher_limit]
df_bookings.shape
```

[70]:
```
(134585, 12)
```

Now lets check the Revenue Realized.

[71]:
```
df_bookings.revenue_realized.describe()
```

[71]:
```
count    134585.000000
mean      12696.095025
std        6928.058192
min        2600.000000
25%        7600.000000
50%       11700.000000
75%       15300.000000
max       45220.000000
Name: revenue_realized, dtype: float64
```

[72]:
```
mean_r,std_r=df_bookings.revenue_realized.mean(),df_bookings.revenue_realized.
  ↪std()
mean_r,std_r
```

[72]:
```
(12696.095025448602, 6928.058192036858)
```

[73]:
```
min_r,max_r=df_bookings.revenue_realized.min(),df_bookings.revenue_realized.
  ↪max()
min_r,max_r
```

[73]:
```
(2600, 45220)
```

Now lets create the higher limit and lower limit.

[74]:
```
higher_limit_r,lower_limit_r=mean_r+3*std_r,mean_r-3*std_r
higher_limit_r,lower_limit_r
```

[74]:
```
(33480.26960155918, -8088.0795506619725)
```

Now lets check if the revenue realized has any negative values.

[75]:
```
df_bookings[df_bookings['revenue_realized']<0]
```

[75]:
```
Empty DataFrame
Columns: [booking_id, property_id, booking_date, check_in_date, checkout_date,
no_guests, room_category, booking_platform, ratings_given, booking_status,
revenue_generated, revenue_realized]
Index: []
```

[76]:
```
df_bookings[df_bookings.revenue_realized>higher_limit_r]
```

[76]:
```
                booking_id  property_id booking_date check_in_date  \
137       May012216559RT41        16559     27-04-22      1/5/2022
139       May012216559RT43        16559     1/5/2022      1/5/2022
143       May012216559RT47        16559     28-04-22      1/5/2022
149      May012216559RT413        16559     24-04-22      1/5/2022
222       May012216560RT45        16560     30-04-22      1/5/2022
…                      …          …          …            …
134331   Jul312219560RT412        19560     31-07-22      31-07-22
134467    Jul312219562RT45        19562     28-07-22      31-07-22
134474   Jul312219562RT412        19562     25-07-22      31-07-22
134581    Jul312217564RT42        17564     31-07-22      31-07-22
134586    Jul312217564RT47        17564     30-07-22      31-07-22

       checkout_date  no_guests room_category booking_platform  ratings_given  \
137         7/5/2022        4.0           RT4           others            NaN
139         2/5/2022        6.0           RT4         tripster            3.0
143         3/5/2022        3.0           RT4           others            5.0
149         7/5/2022        5.0           RT4          logtrip            NaN
222         3/5/2022        5.0           RT4           others            3.0
…                …        …            …                …             …
134331      1/8/2022        6.0           RT4           others            2.0
134467      1/8/2022        6.0           RT4      makeyourtrip            4.0
134474      6/8/2022        5.0           RT4    direct offline            5.0
134581      1/8/2022        4.0           RT4      makeyourtrip            4.0
134586      1/8/2022        4.0           RT4           logtrip            2.0

       booking_status  revenue_generated  revenue_realized
137       Checked Out              38760             38760
139       Checked Out              45220             45220
143       Checked Out              35530             35530
149       Checked Out              41990             41990
222       Checked Out              34580             34580
…               …                 …                …
134331    Checked Out              39900             39900
134467    Checked Out              39900             39900
134474    Checked Out              37050             37050
134581    Checked Out              38760             38760
134586    Checked Out              38760             38760

[1300 rows x 12 columns]
```

[77]:
```
df_bookings['room_category'][df_bookings.revenue_realized>higher_limit_r].
  ↪unique()
```

[77]:
```
array(['RT4'], dtype=object)
```

Upon reviewing the room categories, we found that all values exceeding the upper limit belong to the RT4 category, with the highest value recorded at 45,220. Given that presidential suites are priced significantly higher, we do not classify these instances as outliers.

To verify again we can find the std and mean for only the RT4 room category.From those we can find outlier cut off limits.

[78]:
```
df_bookings[df_bookings.room_category=="RT4"].revenue_realized.describe()
```

[78]:
```
count    16073.000000
mean     23440.103652
std       9048.865206
min       7600.000000
25%      19000.000000
50%      26600.000000
75%      32300.000000
max      45220.000000
Name: revenue_realized, dtype: float64
```

Now lets check the higher limit and check if the maximum value comes within the higher limit.

[79]:
```
df_bookings[df_bookings.room_category=="RT4"].revenue_realized.
  ↪mean()+3*df_bookings[df_bookings.room_category=="RT4"].revenue_realized.std()
```

[79]:
```
50586.69926930781
```

Subsequently, we confirmed that the maximum value falls within the upper limit, reinforcing our conclusion that these values do not qualify as outliers. In cases where a value appears to exceed the established outlier threshold, we will calculate the mean and upper limit for that specific category to determine if they should be classified as outliers.

[80]:
```
df_bookings.isnull().sum()
```

[80]:
```
booking_id               0
property_id              0
booking_date             0
check_in_date            0
checkout_date            0
no_guests                3
room_category            0
booking_platform         0
ratings_given        77905
booking_status           0
revenue_generated        0
revenue_realized         0
```

```
dtype: int64
```

Since the rating is null for a large number of records we should not fill those null values with anything.

14 C.Since we have found the Category to be null in few records of def_agg_bookings lets fix it.

[81]:
```
df_agg_bookings[df_agg_bookings['capacity'].isnull()]
```

[81]:
```
    property_id check_in_date room_category  successful_bookings  capacity
8         17561       1-May-22           RT1                   22       NaN
14        17562       1-May-22           RT1                   12       NaN
```

Lets fill those values null values with median.

[82]:
```
df_agg_bookings.capacity.fillna(df_agg_bookings.capacity.median(), inplace=True)
```

We can also use other operations like filling a null value by its mean or null according to the characteristics of data series or according to the business type.We can also use other functions etc to fill the null values.

ex-df_agg_bookings[‘capacity’].fillna(df_agg_bookings[‘capacity’].mean(), inplace=True) ex-df_agg_bookings[‘capacity’].fillna(method=‘ffill’, inplace=True) ex-df_agg_bookings[‘capacity’].fillna(method=‘bfill’, inplace=True) ex-df_agg_bookings.dropna(subset=[‘capacity’], inplace=True)

Checking if the operation has happened or not.

[83]:
```
df_agg_bookings[df_agg_bookings['capacity'].isnull()]
```

[83]:
```
Empty DataFrame
Columns: [property_id, check_in_date, room_category, successful_bookings,
capacity]
Index: []
```

The null values has been replaced with median.

15 D.Since we have found that in def_agg_bookings few records have successfully bookings greater than capacity,lets fix those.

[84]:
```
df_agg_bookings[df_agg_bookings.capacity<df_agg_bookings.successful_bookings]
```

[84]:
```
      property_id check_in_date room_category  successful_bookings  capacity
3           17558       1-May-22           RT1                   30      19.0
12          16563       1-May-22           RT1                  100      41.0
4136        19558      11-Jun-22           RT2                   50      39.0
6209        19560       2-Jul-22           RT1                  123      26.0
```

```
8522        19559     25-Jul-22            RT1                    35       24.0
9194        18563     31-Jul-22            RT4                    20       18.0
```

Since the values are wrong here and the records are of less number we can remove those records.

[85]:
```
df_agg_bookings = df_agg_bookings[df_agg_bookings.
 ↪successful_bookings<=df_agg_bookings.capacity]
```

Lets now check if the operation has been done or not.

[86]:
```
df_agg_bookings[df_agg_bookings.capacity<df_agg_bookings.successful_bookings]
```

[86]:
```
Empty DataFrame
Columns: [property_id, check_in_date, room_category, successful_bookings,
capacity]
Index: []
```

The records has been successfully removed.

16 E.Lets correct the spelling of values in date data frame.

[87]:
```
df_date
```

[87]:
```
         date  mmm yy week no  day_type
0   01-May-22  May 22    W 19   weekend
1   02-May-22  May 22    W 19  weekeday
2   03-May-22  May 22    W 19  weekeday
3   04-May-22  May 22    W 19  weekeday
4   05-May-22  May 22    W 19  weekeday
..        …     …     …        …
87  27-Jul-22  Jul 22    W 31  weekeday
88  28-Jul-22  Jul 22    W 31  weekeday
89  29-Jul-22  Jul 22    W 31  weekeday
90  30-Jul-22  Jul 22    W 31   weekend
91  31-Jul-22  Jul 22    W 32   weekend

[92 rows x 4 columns]
```

[88]:
```
def chg(d):
    if d=='weekeday':
        return 'weekday'
    else:
        return d

df_date.day_type=df_date['day_type'].apply(lambda x:chg(x))
```

[89]:
```
df_date['day_type'].unique()
```

```
[89]: array(['weekend', 'weekday'], dtype=object)
```

17 Data Transformations Process

18 Creating a occupance percentage column.

```
[90]: n_c=df_agg_bookings.apply(lambda x: x['successful_bookings']/
       ↪x['capacity'],axis=1)
      df_agg_bookings = df_agg_bookings.assign(occ_pct=n_c)
```

```
[91]: df_agg_bookings
```

```
[91]:       property_id check_in_date room_category  successful_bookings  capacity  \
      0           16559      1-May-22           RT1                   25      30.0
      1           19562      1-May-22           RT1                   28      30.0
      2           19563      1-May-22           RT1                   23      30.0
      4           16558      1-May-22           RT1                   18      19.0
      5           17560      1-May-22           RT1                   28      40.0
      …             …             …           …                     …        …
      9195        16563     31-Jul-22           RT4                   13      18.0
      9196        16559     31-Jul-22           RT4                   13      18.0
      9197        17558     31-Jul-22           RT4                    3       6.0
      9198        19563     31-Jul-22           RT4                    3       6.0
      9199        17561     31-Jul-22           RT4                    3       4.0

             occ_pct
      0     0.833333
      1     0.933333
      2     0.766667
      4     0.947368
      5     0.700000
      …          …
      9195  0.722222
      9196  0.722222
      9197  0.500000
      9198  0.500000
      9199  0.750000

      [9194 rows x 6 columns]
```

As we can see a coulmn has been added successfully.

Lets now convert the occ_pct to percentage and also round it.

```
[92]: df_agg_bookings['occ_pct']=df_agg_bookings['occ_pct'].apply(lambda x:␣
       ↪round(x*100,2))
```

[93]:
```
df_agg_bookings
```

[93]:
```
      property_id check_in_date room_category  successful_bookings  capacity  \
0           16559      1-May-22           RT1                   25      30.0
1           19562      1-May-22           RT1                   28      30.0
2           19563      1-May-22           RT1                   23      30.0
4           16558      1-May-22           RT1                   18      19.0
5           17560      1-May-22           RT1                   28      40.0
…             …           …            …                     …         …
9195        16563     31-Jul-22           RT4                   13      18.0
9196        16559     31-Jul-22           RT4                   13      18.0
9197        17558     31-Jul-22           RT4                    3       6.0
9198        19563     31-Jul-22           RT4                    3       6.0
9199        17561     31-Jul-22           RT4                    3       4.0

      occ_pct
0       83.33
1       93.33
2       76.67
4       94.74
5       70.00
…       …
9195    72.22
9196    72.22
9197    50.00
9198    50.00
9199    75.00

 [9194 rows x 6 columns]
```

Now we have successfully changed.

There are actually manly types of data transformations that can be done

ex 1.Creating columns ex 2.Normalization ex 3.Merging data ex 4.Aggregation

19 Insights Generation

20 I) What is an average occupancy rate in each room categories?

[94]:
```
round(df_agg_bookings.groupby("room_category")["occ_pct"].mean(),2)
```

[94]:
```
room_category
RT1    57.89
RT2    58.01
RT3    58.03
RT4    59.28
Name: occ_pct, dtype: float64
```

Now lets add other details of each room category.

```
[95]: df_rooms
```

```
[95]:   room_id    room_class
      0     RT1      Standard
      1     RT2         Elite
      2     RT3       Premium
      3     RT4  Presidential
```

Now lets df_rooms and df_agg_bookings.

```
[96]: df=pd.merge(df_agg_bookings,df_rooms,left_on="room_category",right_on="room_id")
      df.head()
```

```
[96]:    property_id check_in_date room_category  successful_bookings  capacity  \
      0        16559      1-May-22           RT1                   25      30.0
      1        19562      1-May-22           RT1                   28      30.0
      2        19563      1-May-22           RT1                   23      30.0
      3        16558      1-May-22           RT1                   18      19.0
      4        17560      1-May-22           RT1                   28      40.0

         occ_pct room_id room_class
      0    83.33     RT1   Standard
      1    93.33     RT1   Standard
      2    76.67     RT1   Standard
      3    94.74     RT1   Standard
      4    70.00     RT1   Standard
```

We use left_on and right_on in the above code since the values on which we can join has two column names in both.

Now we find the name of the rooms.

```
[97]: grouped = df.groupby('room_category').agg( Occupancy_Percent=('occ_pct',␣
        ↪'mean'),Successful_bookings_count=('successful_bookings',␣
        ↪'count'),Room_class=('room_class','first'))
      grouped['Occupancy_Percent']=grouped['Occupancy_Percent'].round(2)
      print(grouped)
```

```
               Occupancy_Percent  Successful_bookings_count    Room_class
room_category
RT1                        57.89                       2296      Standard
RT2                        58.01                       2299         Elite
RT3                        58.03                       2300       Premium
RT4                        59.28                       2299  Presidential
```

Now we print the relevant details of the room category that is name and average occupancy rate ,Successful booking count and room class.

21 2. Print average occupancy rate per day.

Now we merge the two dataframes of gotel and agg booking together to find the solution.

[98]:
```
df_hotels.head()
```

[98]:
```
   property_id  property_name  category    city
0        16558   Atliq Grands    Luxury   Delhi
1        16559  Atliq Exotica    Luxury  Mumbai
2        16560     Atliq City  Business   Delhi
3        16561      Atliq Blu    Luxury   Delhi
4        16562      Atliq Bay    Luxury   Delhi
```

[99]:
```
df_agg_bookings.head()
```

[99]:
```
   property_id check_in_date room_category  successful_bookings  capacity  \
0        16559      1-May-22           RT1                   25      30.0
1        19562      1-May-22           RT1                   28      30.0
2        19563      1-May-22           RT1                   23      30.0
4        16558      1-May-22           RT1                   18      19.0
5        17560      1-May-22           RT1                   28      40.0

   occ_pct
0    83.33
1    93.33
2    76.67
4    94.74
5    70.00
```

[100]:
```
grouped_2=pd.merge(df_agg_bookings,df_hotels,on="property_id")
grouped_2.head()
```

[100]:
```
   property_id check_in_date room_category  successful_bookings  capacity  \
0        16559      1-May-22           RT1                   25      30.0
1        16559      1-May-22           RT2                   35      41.0
2        16559      1-May-22           RT3                   27      32.0
3        16559      1-May-22           RT4                   17      18.0
4        16559      2-May-22           RT1                   20      30.0

   occ_pct  property_name category    city
0    83.33  Atliq Exotica   Luxury  Mumbai
1    85.37  Atliq Exotica   Luxury  Mumbai
2    84.38  Atliq Exotica   Luxury  Mumbai
3    94.44  Atliq Exotica   Luxury  Mumbai
4    66.67  Atliq Exotica   Luxury  Mumbai
```

[101]:
```
grouped_2.groupby('city')['occ_pct'].mean()
```

```
[101]: city
       Bangalore    56.332376
       Delhi        61.507341
       Hyderabad    58.120652
       Mumbai       57.909181
       Name: occ_pct, dtype: float64
```

22 3. Lets find out when was the occupancy better,weekday or weekend?

```
[102]: df_date.head()
```

```
[102]:         date  mmm yy  week no day_type
       0  01-May-22  May 22    W 19  weekend
       1  02-May-22  May 22    W 19  weekday
       2  03-May-22  May 22    W 19  weekday
       3  04-May-22  May 22    W 19  weekday
       4  05-May-22  May 22    W 19  weekday
```

```
[103]: grouped_3=pd.merge(grouped_2,df_date,left_on="check_in_date",right_on="date")
       grouped_3.head()
```

```
[103]:    property_id check_in_date room_category  successful_bookings  capacity  \
       0        16559     10-May-22           RT2                   25      41.0
       1        16559     10-May-22           RT1                   18      30.0
       2        16559     10-May-22           RT3                   20      32.0
       3        16559     10-May-22           RT4                   13      18.0
       4        19562     10-May-22           RT1                   18      30.0

          occ_pct property_name category       city       date  mmm yy week no  \
       0    60.98 Atliq Exotica   Luxury     Mumbai  10-May-22  May 22    W 20
       1    60.00 Atliq Exotica   Luxury     Mumbai  10-May-22  May 22    W 20
       2    62.50 Atliq Exotica   Luxury     Mumbai  10-May-22  May 22    W 20
       3    72.22 Atliq Exotica   Luxury     Mumbai  10-May-22  May 22    W 20
       4    60.00     Atliq Bay   Luxury  Bangalore  10-May-22  May 22    W 20

         day_type
       0  weekday
       1  weekday
       2  weekday
       3  weekday
       4  weekday
```

```
[104]: grouped_3.groupby('day_type')['occ_pct'].mean().round(2)
```

```
[104]: day_type
       weekday    50.88
       weekend    72.34
       Name: occ_pct, dtype: float64
```

We got to know weekend is better in terms of occupancy rate.

23 4.In the month of June,What is the occupancy for different cities.

```
[105]: df_june_22=grouped_3[grouped_3["mmm yy"]=="Jun 22"]
       df_june_22.head()
```

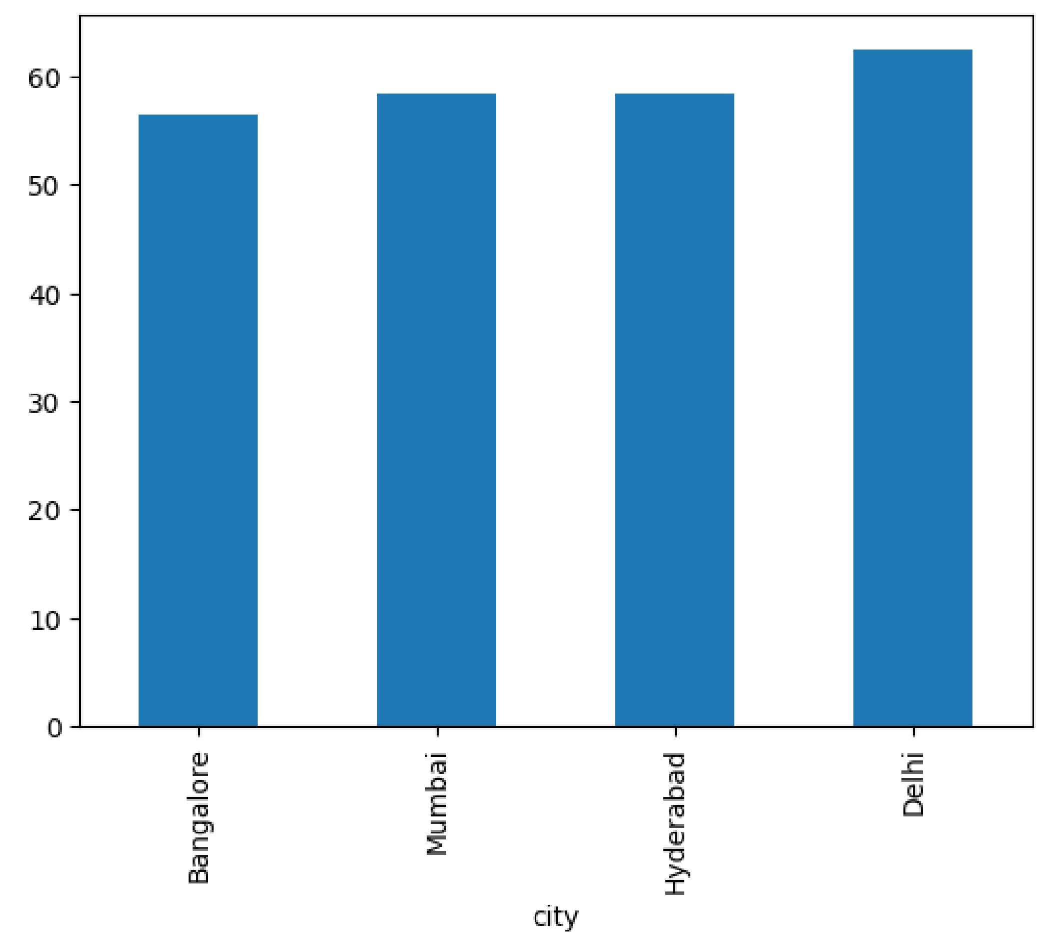
```
[105]:       property_id check_in_date room_category  successful_bookings  capacity  \
       2200        16559     10-Jun-22           RT1                   20      30.0
       2201        16559     10-Jun-22           RT2                   26      41.0
       2202        16559     10-Jun-22           RT3                   20      32.0
       2203        16559     10-Jun-22           RT4                   11      18.0
       2204        19562     10-Jun-22           RT1                   19      30.0

             occ_pct  property_name category       city       date  mmm yy week no  \
       2200    66.67  Atliq Exotica   Luxury     Mumbai  10-Jun-22  Jun 22    W 24
       2201    63.41  Atliq Exotica   Luxury     Mumbai  10-Jun-22  Jun 22    W 24
       2202    62.50  Atliq Exotica   Luxury     Mumbai  10-Jun-22  Jun 22    W 24
       2203    61.11  Atliq Exotica   Luxury     Mumbai  10-Jun-22  Jun 22    W 24
       2204    63.33      Atliq Bay   Luxury  Bangalore  10-Jun-22  Jun 22    W 24

            day_type
       2200  weekday
       2201  weekday
       2202  weekday
       2203  weekday
       2204  weekday
```

```
[106]: df_june_22.groupby('city')['occ_pct'].mean().round(2).sort_values()
```

```
[106]: city
       Bangalore    56.44
       Mumbai       58.38
       Hyderabad    58.46
       Delhi        62.47
       Name: occ_pct, dtype: float64
```

```
[107]: df_june_22.groupby('city')['occ_pct'].mean().round(2).sort_values().
        ↪plot(kind="bar")
```

```
[107]: <Axes: xlabel='city'>
```



24 5.We hot new data for the month of August.Lets Append that to the existing data.

[108]:
```
df_august=pd.read_csv("new_data_august.csv")
df_august.head()
```

[108]:
```
   property_id  property_name  category       city room_category room_class  \
0        16559  Atliq Exotica    Luxury     Mumbai           RT1   Standard
1        19562      Atliq Bay    Luxury  Bangalore           RT1   Standard
2        19563   Atliq Palace  Business  Bangalore           RT1   Standard
3        19558   Atliq Grands    Luxury  Bangalore           RT1   Standard
4        19560     Atliq City  Business  Bangalore           RT1   Standard

  check_in_date  mmm yy week no  day_type  successful_bookings  capacity  \
0     01-Aug-22  Aug-22    W 32  weekeday                   30        30
1     01-Aug-22  Aug-22    W 32  weekeday                   21        30
```

```
2      01-Aug-22  Aug-22    W 32   weekeday                     23         30
3      01-Aug-22  Aug-22    W 32   weekeday                     30         40
4      01-Aug-22  Aug-22    W 32   weekeday                     20         26

     occ%
0  100.00
1   70.00
2   76.67
3   75.00
4   76.92
```

[109]:
```
df_august.day_type.unique()
```

[109]:
```
array(['weekeday'], dtype=object)
```

[110]:
```
df_august
```

[110]:
```
   property_id  property_name  category       city room_category room_class  \
0        16559  Atliq Exotica    Luxury     Mumbai           RT1   Standard
1        19562      Atliq Bay    Luxury  Bangalore           RT1   Standard
2        19563   Atliq Palace  Business  Bangalore           RT1   Standard
3        19558   Atliq Grands    Luxury  Bangalore           RT1   Standard
4        19560     Atliq City  Business  Bangalore           RT1   Standard
5        17561      Atliq Blu    Luxury     Mumbai           RT1   Standard
6        17564  Atliq Seasons  Business     Mumbai           RT1   Standard

  check_in_date  mmm yy week no  day_type  successful_bookings  capacity  \
0      01-Aug-22  Aug-22    W 32   weekeday                     30         30
1      01-Aug-22  Aug-22    W 32   weekeday                     21         30
2      01-Aug-22  Aug-22    W 32   weekeday                     23         30
3      01-Aug-22  Aug-22    W 32   weekeday                     30         40
4      01-Aug-22  Aug-22    W 32   weekeday                     20         26
5      01-Aug-22  Aug-22    W 32   weekeday                     18         26
6      01-Aug-22  Aug-22    W 32   weekeday                     10         16

     occ%
0  100.00
1   70.00
2   76.67
3   75.00
4   76.92
5   69.23
6   62.50
```

[111]:
```
df_august.columns
```

```
[111]: Index(['property_id', 'property_name', 'category', 'city', 'room_category',
               'room_class', 'check_in_date', 'mmm yy', 'week no', 'day_type',
               'successful_bookings', 'capacity', 'occ%'],
              dtype='object')
```

```
[112]: grouped_3.columns
```

```
[112]: Index(['property_id', 'check_in_date', 'room_category', 'successful_bookings',
               'capacity', 'occ_pct', 'property_name', 'category', 'city', 'date',
               'mmm yy', 'week no', 'day_type'],
              dtype='object')
```

We have found a small typo error in day type of august dataframe lets quickly fix it.

```
[113]: def typo(x):
           if(x=='weekeday'):
               return 'weekday'
           else:
               return x
       df_august['day_type']=df_august['day_type'].apply(lambda x:typo(x))
```

```
[114]: df_august_renamed=df_august.rename(columns={'occ%':'occ_pct'})
       grouped_4=pd.concat([grouped_3,df_august_renamed],ignore_index=True,axis=0)
       grouped_4.head()
```

```
[114]:    property_id check_in_date room_category  successful_bookings  capacity  \
       0        16559     10-May-22           RT2                   25      41.0
       1        16559     10-May-22           RT1                   18      30.0
       2        16559     10-May-22           RT3                   20      32.0
       3        16559     10-May-22           RT4                   13      18.0
       4        19562     10-May-22           RT1                   18      30.0

          occ_pct  property_name category       city       date  mmm yy week no  \
       0    60.98  Atliq Exotica   Luxury     Mumbai  10-May-22  May 22    W 20
       1    60.00  Atliq Exotica   Luxury     Mumbai  10-May-22  May 22    W 20
       2    62.50  Atliq Exotica   Luxury     Mumbai  10-May-22  May 22    W 20
       3    72.22  Atliq Exotica   Luxury     Mumbai  10-May-22  May 22    W 20
       4    60.00      Atliq Bay   Luxury  Bangalore  10-May-22  May 22    W 20

         day_type room_class
       0  weekday        NaN
       1  weekday        NaN
       2  weekday        NaN
       3  weekday        NaN
       4  weekday        NaN
```

```
[115]: grouped_4.tail()
```

```
[115]:       property_id check_in_date room_category  successful_bookings  capacity  \
6499        19563     01-Aug-22           RT1                   23      30.0
6500        19558     01-Aug-22           RT1                   30      40.0
6501        19560     01-Aug-22           RT1                   20      26.0
6502        17561     01-Aug-22           RT1                   18      26.0
6503        17564     01-Aug-22           RT1                   10      16.0

      occ_pct  property_name  category       city date  mmm yy week no  \
6499    76.67  Atliq Palace  Business  Bangalore  NaN  Aug-22    W 32
6500    75.00  Atliq Grands    Luxury  Bangalore  NaN  Aug-22    W 32
6501    76.92    Atliq City  Business  Bangalore  NaN  Aug-22    W 32
6502    69.23     Atliq Blu    Luxury     Mumbai  NaN  Aug-22    W 32
6503    62.50 Atliq Seasons  Business     Mumbai  NaN  Aug-22    W 32

     day_type room_class
6499  weekday   Standard
6500  weekday   Standard
6501  weekday   Standard
6502  weekday   Standard
6503  weekday   Standard
```

We have renamed one of the column in the august dataframe because other wise it would return null for occ% and it would have null for occ_pct.

25 6.Lets now print revenue realized per city.

```
[116]: df_bookings.head()
```

```
[116]:         booking_id  property_id booking_date check_in_date checkout_date  \
0  May012216558RT11        16558     27-04-22      1/5/2022      2/5/2022
1  May012216558RT12        16558     30-04-22      1/5/2022      2/5/2022
3  May012216558RT14        16558     28-04-22      1/5/2022      2/5/2022
4  May012216558RT15        16558     27-04-22      1/5/2022      2/5/2022
5  May012216558RT16        16558     1/5/2022      1/5/2022      3/5/2022

   no_guests room_category booking_platform  ratings_given booking_status  \
0        3.0           RT1    direct online            1.0    Checked Out
1        2.0           RT1           others            NaN      Cancelled
3        2.0           RT1           others            NaN      Cancelled
4        4.0           RT1    direct online            5.0    Checked Out
5        2.0           RT1           others            4.0    Checked Out

   revenue_generated  revenue_realized
0              10010             10010
1               9100              3640
3               9100              3640
4              10920             10920
```

```
5              9100              9100
```

[117]:
```
df_hotels.head()
```

[117]:
```
   property_id  property_name  category    city
0        16558   Atliq Grands    Luxury   Delhi
1        16559  Atliq Exotica    Luxury  Mumbai
2        16560     Atliq City  Business   Delhi
3        16561      Atliq Blu    Luxury   Delhi
4        16562      Atliq Bay    Luxury   Delhi
```

[118]:
```
grouped_5=pd.merge(df_bookings,df_hotels,on='property_id')
grouped_5.head()
```

[118]:
```
         booking_id  property_id booking_date check_in_date checkout_date  \
0  May012216558RT11        16558     27-04-22      1/5/2022      2/5/2022
1  May012216558RT12        16558     30-04-22      1/5/2022      2/5/2022
2  May012216558RT14        16558     28-04-22      1/5/2022      2/5/2022
3  May012216558RT15        16558     27-04-22      1/5/2022      2/5/2022
4  May012216558RT16        16558     1/5/2022      1/5/2022      3/5/2022

   no_guests room_category booking_platform  ratings_given booking_status  \
0        3.0           RT1    direct online            1.0    Checked Out
1        2.0           RT1           others            NaN      Cancelled
2        2.0           RT1           others            NaN      Cancelled
3        4.0           RT1    direct online            5.0    Checked Out
4        2.0           RT1           others            4.0    Checked Out

   revenue_generated  revenue_realized property_name category   city
0              10010             10010  Atliq Grands   Luxury  Delhi
1               9100              3640  Atliq Grands   Luxury  Delhi
2               9100              3640  Atliq Grands   Luxury  Delhi
3              10920             10920  Atliq Grands   Luxury  Delhi
4               9100              9100  Atliq Grands   Luxury  Delhi
```

[119]:
```
grouped_5.groupby('city')['revenue_realized'].sum().sort_values(ascending=False)
```

[119]:
```
city
Mumbai       668608011
Bangalore    420397050
Hyderabad    325232870
Delhi        294466018
Name: revenue_realized, dtype: int64
```

26 7.Print month by month revenue.

[120]:
```
df_date.head()
```

[120]:
```
        date  mmm yy week no day_type
0  01-May-22  May 22    W 19  weekend
1  02-May-22  May 22    W 19  weekday
2  03-May-22  May 22    W 19  weekday
3  04-May-22  May 22    W 19  weekday
4  05-May-22  May 22    W 19  weekday
```

[121]:
```
df_bookings.head()
```

[121]:
```
         booking_id  property_id booking_date check_in_date checkout_date  \
0  May012216558RT11        16558     27-04-22      1/5/2022      2/5/2022
1  May012216558RT12        16558     30-04-22      1/5/2022      2/5/2022
3  May012216558RT14        16558     28-04-22      1/5/2022      2/5/2022
4  May012216558RT15        16558     27-04-22      1/5/2022      2/5/2022
5  May012216558RT16        16558     1/5/2022      1/5/2022      3/5/2022

   no_guests room_category booking_platform  ratings_given booking_status  \
0        3.0           RT1    direct online            1.0    Checked Out
1        2.0           RT1           others            NaN      Cancelled
3        2.0           RT1           others            NaN      Cancelled
4        4.0           RT1    direct online            5.0    Checked Out
5        2.0           RT1           others            4.0    Checked Out

   revenue_generated  revenue_realized
0              10010             10010
1               9100              3640
3               9100              3640
4              10920             10920
5               9100              9100
```

[122]:
```
df_bookings.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 134585 entries, 0 to 134589
Data columns (total 12 columns):
 #   Column             Non-Null Count   Dtype
---  ------             --------------   -----
 0   booking_id         134585 non-null  object
 1   property_id        134585 non-null  int64
 2   booking_date       134585 non-null  object
 3   check_in_date      134585 non-null  object
 4   checkout_date      134585 non-null  object
 5   no_guests          134582 non-null  float64
 6   room_category      134585 non-null  object
 7   booking_platform   134585 non-null  object
 8   ratings_given      56680 non-null   float64
 9   booking_status     134585 non-null  object
 10  revenue_generated  134585 non-null  int64
 11  revenue_realized   134585 non-null  int64
dtypes: float64(2), int64(3), object(7)
memory usage: 13.3+ MB
```

[123]:
```
df_date.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 92 entries, 0 to 91
Data columns (total 4 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   date      92 non-null     object
 1   mmm yy    92 non-null     object
 2   week no   92 non-null     object
 3   day_type  92 non-null     object
dtypes: object(4)
memory usage: 3.0+ KB
```

[124]:
```
from datetime import datetime
```

We can see that the check in date and the date formats in both the data frames are different so it would return null if we merge on those two values.So we can convert both of its data type object datatype to datetime.

To achieve a clean and visually appealing transformation of the check_in_date column, which contains various date formats, we will create a straightforward function. This function will clearly specify the different formats used, allowing for easy identification and conversion of the data into a standardized datetime format.

[125]:
```
def date_spliting(x):
    for fmt in ("%d/%m/%Y", "%d-%m-%y", "%m/%d/%Y"):
        try:
            return datetime.strptime(x, fmt)
        except ValueError:

            continue

df_bookings["check_in_date"] = df_bookings["check_in_date"].apply(lambda x:
 ↪date_spliting(x))
df_bookings.check_in_date.unique()
```

[125]:
```
<DatetimeArray>
['2022-05-01 00:00:00', '2022-05-02 00:00:00', '2022-05-03 00:00:00',
 '2022-05-04 00:00:00', '2022-05-05 00:00:00', '2022-05-06 00:00:00',
 '2022-05-07 00:00:00', '2022-05-08 00:00:00', '2022-05-09 00:00:00',
 '2022-05-10 00:00:00', '2022-05-11 00:00:00', '2022-05-12 00:00:00',
 '2022-05-13 00:00:00', '2022-05-14 00:00:00', '2022-05-15 00:00:00',
 '2022-05-16 00:00:00', '2022-05-17 00:00:00', '2022-05-18 00:00:00',
 '2022-05-19 00:00:00', '2022-05-20 00:00:00', '2022-05-21 00:00:00',
 '2022-05-22 00:00:00', '2022-05-23 00:00:00', '2022-05-24 00:00:00',
 '2022-05-25 00:00:00', '2022-05-26 00:00:00', '2022-05-27 00:00:00',
 '2022-05-28 00:00:00', '2022-05-29 00:00:00', '2022-05-30 00:00:00',
 '2022-05-31 00:00:00', '2022-06-01 00:00:00', '2022-06-02 00:00:00',
 '2022-06-03 00:00:00', '2022-06-04 00:00:00', '2022-06-05 00:00:00',
 '2022-06-06 00:00:00', '2022-06-07 00:00:00', '2022-06-08 00:00:00',
 '2022-06-09 00:00:00', '2022-06-10 00:00:00', '2022-06-11 00:00:00',
 '2022-06-12 00:00:00', '2022-06-13 00:00:00', '2022-06-14 00:00:00',
 '2022-06-15 00:00:00', '2022-06-16 00:00:00', '2022-06-17 00:00:00',
 '2022-06-18 00:00:00', '2022-06-19 00:00:00', '2022-06-20 00:00:00',
 '2022-06-21 00:00:00', '2022-06-22 00:00:00', '2022-06-23 00:00:00',
 '2022-06-24 00:00:00', '2022-06-25 00:00:00', '2022-06-26 00:00:00',
 '2022-06-27 00:00:00', '2022-06-28 00:00:00', '2022-06-29 00:00:00',
 '2022-06-30 00:00:00', '2022-07-01 00:00:00', '2022-07-02 00:00:00',
 '2022-07-03 00:00:00', '2022-07-04 00:00:00', '2022-07-05 00:00:00',
 '2022-07-06 00:00:00', '2022-07-07 00:00:00', '2022-07-08 00:00:00',
 '2022-07-09 00:00:00', '2022-07-10 00:00:00', '2022-07-11 00:00:00',
 '2022-07-12 00:00:00', '2022-07-13 00:00:00', '2022-07-14 00:00:00',
 '2022-07-15 00:00:00', '2022-07-16 00:00:00', '2022-07-17 00:00:00',
 '2022-07-18 00:00:00', '2022-07-19 00:00:00', '2022-07-20 00:00:00',
 '2022-07-21 00:00:00', '2022-07-22 00:00:00', '2022-07-23 00:00:00',
 '2022-07-24 00:00:00', '2022-07-25 00:00:00', '2022-07-26 00:00:00',
 '2022-07-27 00:00:00', '2022-07-28 00:00:00', '2022-07-29 00:00:00',
 '2022-07-30 00:00:00', '2022-07-31 00:00:00']
Length: 92, dtype: datetime64[ns]
```

[126]:
```
df_bookings.nunique()
```

[126]:
```
booking_id           134585
property_id              25
booking_date            116
check_in_date            92
checkout_date            97
no_guests                 9
room_category             4
booking_platform          7
ratings_given             5
booking_status            3
revenue_generated        62
revenue_realized        124
dtype: int64
```

[127]:
```
df_date['date']=pd.to_datetime(df_date['date'],format="%d-%b-%y")
df_date.date.unique()
```

[127]:
```
<DatetimeArray>
['2022-05-01 00:00:00', '2022-05-02 00:00:00', '2022-05-03 00:00:00',
 '2022-05-04 00:00:00', '2022-05-05 00:00:00', '2022-05-06 00:00:00',
 '2022-05-07 00:00:00', '2022-05-08 00:00:00', '2022-05-09 00:00:00',
 '2022-05-10 00:00:00', '2022-05-11 00:00:00', '2022-05-12 00:00:00',
 '2022-05-13 00:00:00', '2022-05-14 00:00:00', '2022-05-15 00:00:00',
 '2022-05-16 00:00:00', '2022-05-17 00:00:00', '2022-05-18 00:00:00',
 '2022-05-19 00:00:00', '2022-05-20 00:00:00', '2022-05-21 00:00:00',
 '2022-05-22 00:00:00', '2022-05-23 00:00:00', '2022-05-24 00:00:00',
 '2022-05-25 00:00:00', '2022-05-26 00:00:00', '2022-05-27 00:00:00',
 '2022-05-28 00:00:00', '2022-05-29 00:00:00', '2022-05-30 00:00:00',
 '2022-05-31 00:00:00', '2022-06-01 00:00:00', '2022-06-02 00:00:00',
 '2022-06-03 00:00:00', '2022-06-04 00:00:00', '2022-06-05 00:00:00',
 '2022-06-06 00:00:00', '2022-06-07 00:00:00', '2022-06-08 00:00:00',
 '2022-06-09 00:00:00', '2022-06-10 00:00:00', '2022-06-11 00:00:00',
 '2022-06-12 00:00:00', '2022-06-13 00:00:00', '2022-06-14 00:00:00',
 '2022-06-15 00:00:00', '2022-06-16 00:00:00', '2022-06-17 00:00:00',
 '2022-06-18 00:00:00', '2022-06-19 00:00:00', '2022-06-20 00:00:00',
 '2022-06-21 00:00:00', '2022-06-22 00:00:00', '2022-06-23 00:00:00',
 '2022-06-24 00:00:00', '2022-06-25 00:00:00', '2022-06-26 00:00:00',
 '2022-06-27 00:00:00', '2022-06-28 00:00:00', '2022-06-29 00:00:00',
 '2022-06-30 00:00:00', '2022-07-01 00:00:00', '2022-07-02 00:00:00',
 '2022-07-03 00:00:00', '2022-07-04 00:00:00', '2022-07-05 00:00:00',
 '2022-07-06 00:00:00', '2022-07-07 00:00:00', '2022-07-08 00:00:00',
 '2022-07-09 00:00:00', '2022-07-10 00:00:00', '2022-07-11 00:00:00',
 '2022-07-12 00:00:00', '2022-07-13 00:00:00', '2022-07-14 00:00:00',
 '2022-07-15 00:00:00', '2022-07-16 00:00:00', '2022-07-17 00:00:00',
 '2022-07-18 00:00:00', '2022-07-19 00:00:00', '2022-07-20 00:00:00',
 '2022-07-21 00:00:00', '2022-07-22 00:00:00', '2022-07-23 00:00:00',
 '2022-07-24 00:00:00', '2022-07-25 00:00:00', '2022-07-26 00:00:00',
 '2022-07-27 00:00:00', '2022-07-28 00:00:00', '2022-07-29 00:00:00',
 '2022-07-30 00:00:00', '2022-07-31 00:00:00']
Length: 92, dtype: datetime64[ns]
```

b in the format stands for short form of month in 3letters ex january = jan.

[128]:
```
grouped_6=pd.merge(df_bookings,df_date,left_on="check_in_date",right_on="date")
grouped_6.head()
```

[128]:
```
        booking_id  property_id booking_date check_in_date checkout_date  \
0  May012216558RT11        16558     27-04-22    2022-05-01      2/5/2022
1  May012216558RT12        16558     30-04-22    2022-05-01      2/5/2022
2  May012216558RT14        16558     28-04-22    2022-05-01      2/5/2022
3  May012216558RT15        16558     27-04-22    2022-05-01      2/5/2022
4  May012216558RT16        16558     1/5/2022    2022-05-01      3/5/2022
```

```
   no_guests room_category booking_platform  ratings_given booking_status  \
0        3.0           RT1    direct online            1.0    Checked Out
1        2.0           RT1           others            NaN      Cancelled
2        2.0           RT1           others            NaN      Cancelled
3        4.0           RT1    direct online            5.0    Checked Out
4        2.0           RT1           others            4.0    Checked Out

   revenue_generated  revenue_realized       date  mmm yy week no day_type
0              10010             10010 2022-05-01  May 22     W 19  weekend
1               9100              3640 2022-05-01  May 22     W 19  weekend
2               9100              3640 2022-05-01  May 22     W 19  weekend
3              10920             10920 2022-05-01  May 22     W 19  weekend
4               9100              9100 2022-05-01  May 22     W 19  weekend
```

[129]:
```
grouped_6.groupby('mmm yy')['revenue_realized'].sum()
```

[129]:
```
mmm yy
Jul 22    572895608
Jun 22    553932355
May 22    581875986
Name: revenue_realized, dtype: int64
```

If we make rename date in df_date to check_in_date we can avoid the duplicate column in grouped_6 dataframe.

27 8.Print revenue realized per hotel.

[130]:
```
df_bookings.head()
```

[130]:
```
         booking_id  property_id booking_date check_in_date checkout_date  \
0  May012216558RT11        16558     27-04-22    2022-05-01      2/5/2022
1  May012216558RT12        16558     30-04-22    2022-05-01      2/5/2022
3  May012216558RT14        16558     28-04-22    2022-05-01      2/5/2022
4  May012216558RT15        16558     27-04-22    2022-05-01      2/5/2022
5  May012216558RT16        16558     1/5/2022    2022-05-01      3/5/2022

   no_guests room_category booking_platform  ratings_given booking_status  \
0        3.0           RT1    direct online            1.0    Checked Out
1        2.0           RT1           others            NaN      Cancelled
3        2.0           RT1           others            NaN      Cancelled
4        4.0           RT1    direct online            5.0    Checked Out
5        2.0           RT1           others            4.0    Checked Out

   revenue_generated  revenue_realized
0              10010             10010
1               9100              3640
```

```
3               9100                 3640
4              10920                10920
5               9100                 9100
```

[131]:
```
df_hotels.head()
```

[131]:
```
   property_id  property_name  category    city
0        16558   Atliq Grands    Luxury   Delhi
1        16559  Atliq Exotica    Luxury  Mumbai
2        16560     Atliq City  Business   Delhi
3        16561      Atliq Blu    Luxury   Delhi
4        16562      Atliq Bay    Luxury   Delhi
```

[132]:
```
grouped_7=pd.merge(df_bookings,df_hotels,on='property_id')
grouped_7.head()
```

[132]:
```
         booking_id  property_id booking_date check_in_date checkout_date  \
0  May012216558RT11        16558     27-04-22    2022-05-01      2/5/2022
1  May012216558RT12        16558     30-04-22    2022-05-01      2/5/2022
2  May012216558RT14        16558     28-04-22    2022-05-01      2/5/2022
3  May012216558RT15        16558     27-04-22    2022-05-01      2/5/2022
4  May012216558RT16        16558     1/5/2022    2022-05-01      3/5/2022

   no_guests room_category booking_platform  ratings_given booking_status  \
0        3.0           RT1    direct online            1.0    Checked Out
1        2.0           RT1           others            NaN      Cancelled
2        2.0           RT1           others            NaN      Cancelled
3        4.0           RT1    direct online            5.0    Checked Out
4        2.0           RT1           others            4.0    Checked Out

   revenue_generated  revenue_realized property_name category   city
0              10010             10010  Atliq Grands   Luxury  Delhi
1               9100              3640  Atliq Grands   Luxury  Delhi
2               9100              3640  Atliq Grands   Luxury  Delhi
3              10920             10920  Atliq Grands   Luxury  Delhi
4               9100              9100  Atliq Grands   Luxury  Delhi
```

[133]:
```
grouped_7.groupby("property_name")["revenue_realized"].sum().round(2).
 ↪sort_values()
```

[133]:
```
property_name
Atliq Seasons     66125495
Atliq Grands     211523664
Atliq Bay        260025978
Atliq Blu        260855522
Atliq City       285811939
Atliq Palace     304081863
Atliq Exotica    320279488
Name: revenue_realized, dtype: int64
```

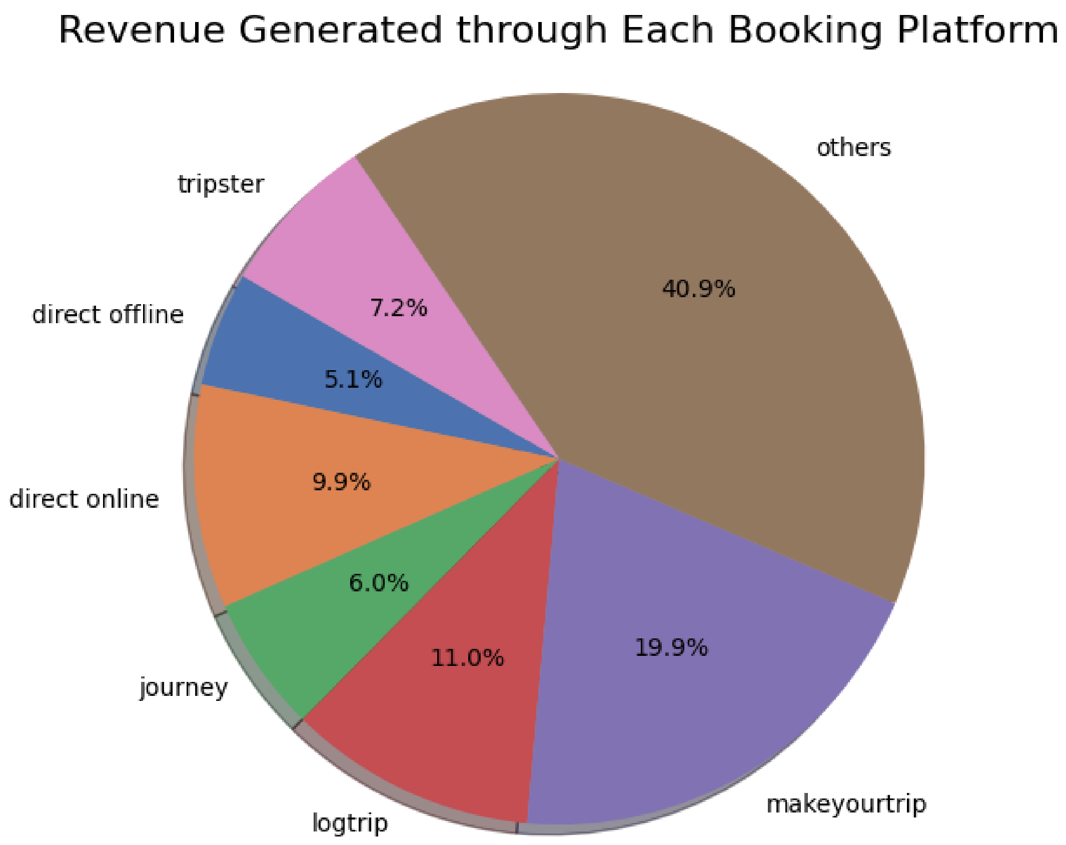
28 9.Print average rating per city.

[134]:
```
grouped_7.groupby("city")["ratings_given"].mean().round(2).
↪sort_values(ascending=False)
```

[134]:
```
city
Delhi        3.78
Hyderabad    3.66
Mumbai       3.65
Bangalore    3.41
Name: ratings_given, dtype: float64
```

29 10.Print a pie chart of revenue realized per bookings platform.

[135]:
```
import matplotlib.pyplot as plt
import seaborn as sns
plt.figure(figsize=(8, 6))
revenue_data = df_bookings.groupby('booking_platform')['revenue_realized'].sum()
plt.pie(revenue_data,
        labels=revenue_data.index,  # After grouping the booking_platform␣
↪becomes the index
        colors=sns.color_palette("deep"),  # Use a color palette from Seaborn
        autopct='%1.1f%%',
        startangle=150,
        shadow=True)
plt.axis('equal')
plt.title('Revenue Generated through Each Booking Platform', fontsize=16)
plt.show()
```



My linkedin profile-https://www.linkedin.com/in/nirmal-simon-36b1b6207/

```
[ ]:
```