OYO Rooms Goa

Objective: To perform exploratory data analysis on OYOs in Goa, and predict the rating new & unrated OYOs in Goa

Code For Scraping the Data

```
from selenium import webdriver
from bs4 import BeautifulSoup
import pandas as pd
import os
os.remove("hotel3.csv")
driver = webdriver.Chrome(executable_path=r"C:\Users\dayne\chromedriver.exe") #Set the path to chromedriver
headers = {'User-Agent': 'Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:77.0) Gecko/20100101 Firefox/77.0'}
driver.get("https://www.oyorooms.com/111193/")
driver.find_element_by_css_selector('.c-1vevh8c').click()
a=[]
content = driver.page_source
soup = BeautifulSoup(content)
name1=soup.find('h1', attrs={'itemprop':'name'})
a.append(name1.text.strip())
name2=soup.find('div', attrs={'class':'c-1qcdse5'})
a.append(name2.text.strip())
name3=soup.find('div', attrs={'class':'c-v9oteh'})
a.append(name3.text.strip())
name4=soup.find('span', attrs={'itemprop':'streetAddress'})
a.append(name4.text.strip())
name5=soup.find('span', attrs={'class':'listingPrice__finalPrice listingPrice__finalPrice--black'})
a.append(name5.text.strip())
xyz = soup.findAll('div',href=False, attrs={'itemprop':'amenityFeature'})
xyz
for lap in xyz:
    name=lap.find('div', attrs={'itemprop':'name'})
    a.append(name)
df = pd.DataFrame({'Product Name':a})
df.to_csv('hotel3.csv', index=False, encoding='utf-8')
```

Scraping for hotels was done individually on each hotel website, **to obtain data such as Address, Amenities, Price, Name, Category**

Code For Regression

#Importing The Libraries

```
import pandas as pd
import numpy as np
```

#Importing the datasets

```
df=pd.read_csv("OYO-Training.csv")
df1=pd.read_csv("OYO-Testing.csv")
```

#Splitting the datasets

```
X = df.iloc[:, 1:-1].values
y = df.iloc[:, -1].values
X1=df1.iloc[:,1:-1].values

from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.2, random_state = 0)
```

#Multiple Linear Regression

```
from sklearn.linear_model import LinearRegression
regressor = LinearRegression()
regressor.fit(X_train, y_train)
y_pred = regressor.predict(X_test)
np.set_printoptions(precision=2)
print("Multiple Linear Regression MSE")
mean_squared_error(y_test,y_pred)
```

```
Multiple Linear Regression MSE
Out[820]: 3.3033226865790O6
```

```
#Support Vector Regression
from sklearn.svm import SVR
regressor = SVR(kernel = 'rbf')
regressor.fit(X_train, y_train)
y_pred = regressor.predict(X_test)
print("SVR MSE")
mean_squared_error(y_test,y_pred)
```

```
SVR MSE
Out[821]: 1.2098364477027768
```

```
#Decision Tree
from sklearn.tree import DecisionTreeRegressor
regressor = DecisionTreeRegressor(random_state = 0)
regressor.fit(X_train, y_train)
y_pred = regressor.predict(X_test)
print("Decision Tree MSE")
mean_squared_error(y_test,y_pred)
```

```
Decision Tree MSE
Out[822]: 0.6116666666666666
```

```
#Random Forest
from sklearn.ensemble import RandomForestRegressor
regressor = RandomForestRegressor(n_estimators = 10, random_state = 0)
regressor.fit(X_train, y_train)
y_pred = regressor.predict(X_test)
```

```
np.set_printoptions(precision=2)
print("Random Forest MSE")
mean_squared_error(y_test,y_pred)
```

```
Random Forest MSE
Out[823]: 0.8451749999999999
```

```
#Best output obtained for Decision Tree Hence we will use it for predicting the ratings of new OYO hotels
from sklearn.tree import DecisionTreeRegressor
regressor = DecisionTreeRegressor(random_state = 0)
regressor.fit(X_train, y_train)
y_pred2=regressor.predict(X1)
a=pd.DataFrame(y_pred2)
a
a.to_csv("oyo-output1.csv")
```

```
Out[831]:
     0
0  4.2
1  4.3
2  4.3
3  4.2
4  4.2
5  4.2
6  3.5
7  4.5
8  2.9
9  4.5
```

Exploratory Data Analysis After Combining The Results

#Importing The Libraries

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

#Adding the combined dataset

```
df=pd.read_csv("OYO-EDA.csv")
```

#Exploratory Data Analysis

```
df['Price'].describe()
df['Rating'].describe()
```

```
In [751]: df['Rating'].describe()
Out[751]:
count    69.000000
mean      4.156087
std       0.316233
min       3.500000
25%       3.920000
50%       4.200000
75%       4.400000
max       4.800000
Name: Rating, dtype: float64
```

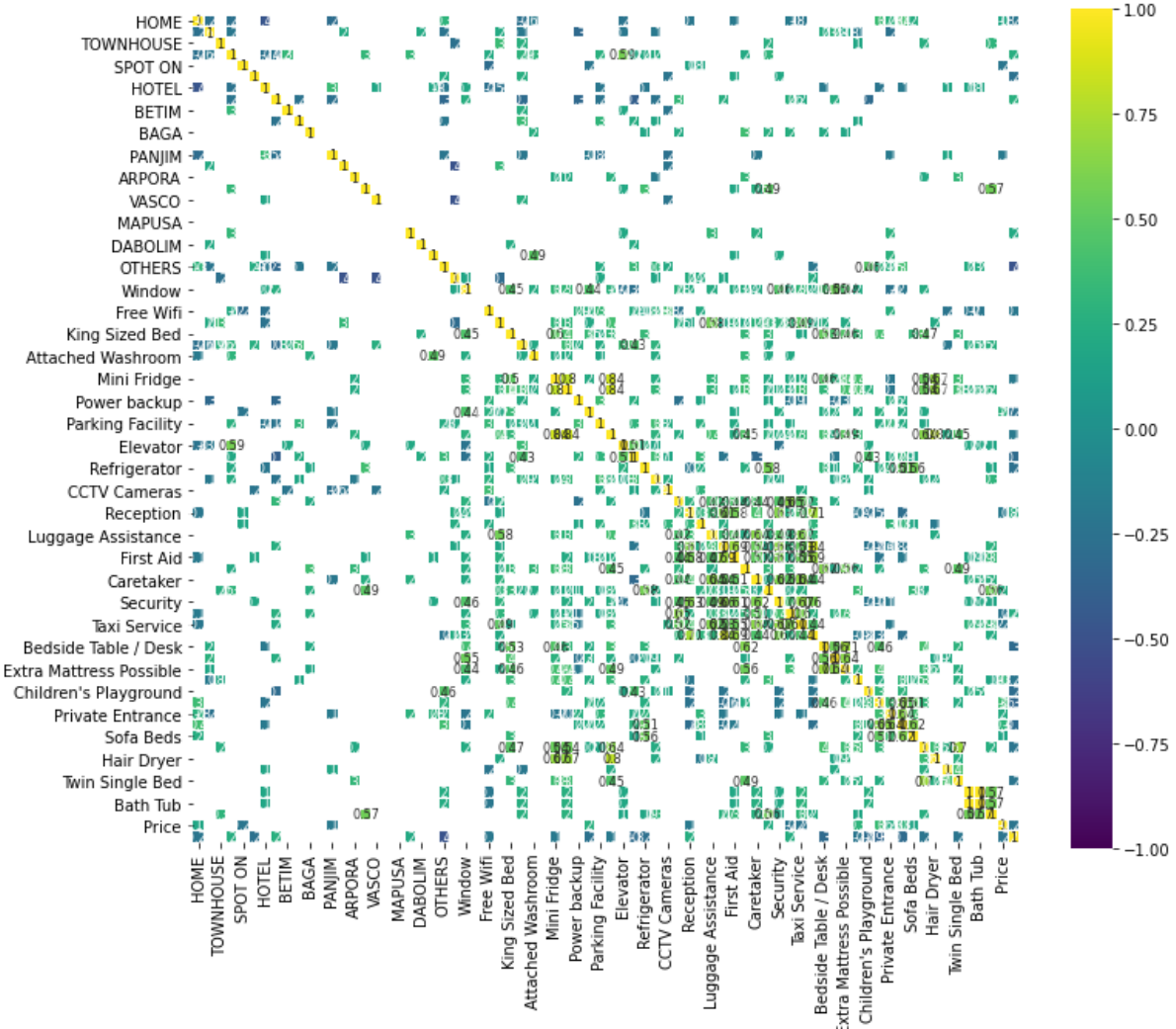
```
In [750]: df['Price'].describe()
Out[750]:
count       69.000000
mean      5537.043478
std       2654.742712
min        827.000000
25%       3825.000000
50%       5110.000000
75%       6827.000000
max      13541.000000
Name: Price, dtype: float64
```

#Generating the correlations
df_num_corr = df.corr()['Price'][1:]
golden_features_list = df_num_corr[abs(df_num_corr) > 0.2].sort_values(ascending=False)
print("There is {} strongly correlated values with SalePrice:\n{}".format(len(golden_features_list), golden_features_list))

```
There is 11 strongly correlated values with SalePrice:
Price                1.000000
Modern Wardrobe      0.362651
Balcony              0.303867
Shower Head          0.300436
Geyser               0.266937
Garden/Backyard      0.231740
Private Entrance     0.225538
SPOT ON             -0.215098
Taxi Service        -0.220191
Car Rentals         -0.222147
Rating              -0.223718
Name: Price, dtype: float64
```

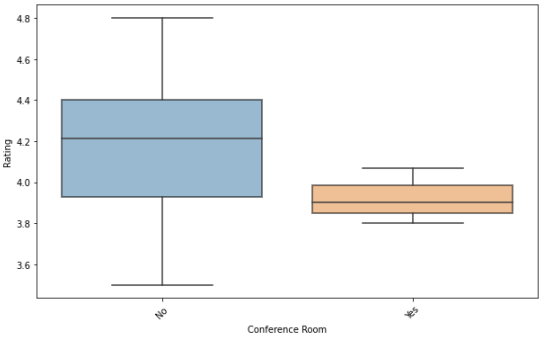
#Heat Map Of Correlations

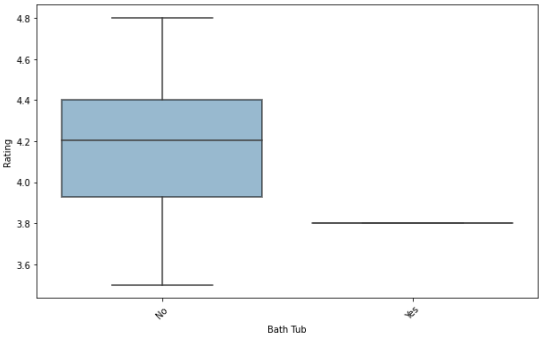
```
corr = df.drop(['Name'], axis=1).corr()
plt.figure(figsize=(12, 10))

sns.heatmap(corr[(corr >= 0.175) | (corr <= -0.175)],
            cmap='viridis', vmax=1.0, vmin=-1.0, linewidths=0.1,
            annot=True, annot_kws={"size": 8}, square=True);
```

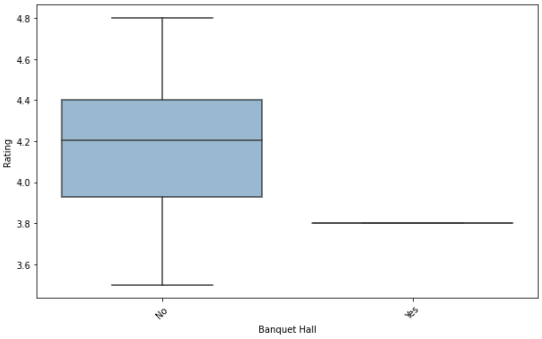


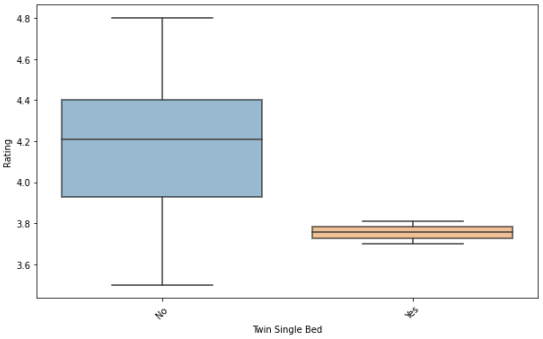
#Creating Box-Plots with Y axis as Rating

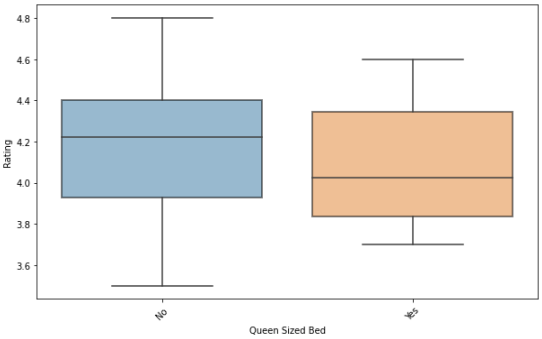
```
df_categ2=df.drop(['Name'],axis=1)
df_categ2=df_categ.replace(0,"No")
df_categ2=df_categ.replace(1,"Yes")
for i in range(72):
    plt.figure(figsize = (10, 6))
    ax = sns.boxplot(x=df_categ2.iloc[:,i], y='Rating', data=df_categ2)
    plt.setp(ax.artists, alpha=.5, linewidth=2, edgecolor="k")
    plt.xticks(rotation=45)
```

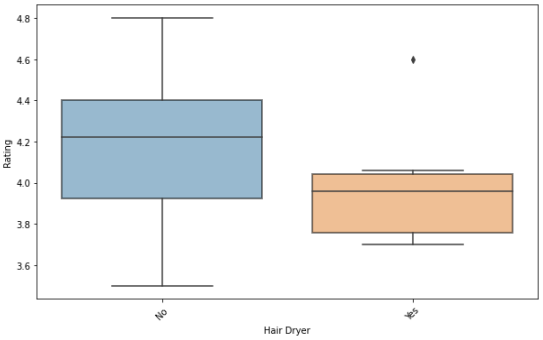

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Conference Room

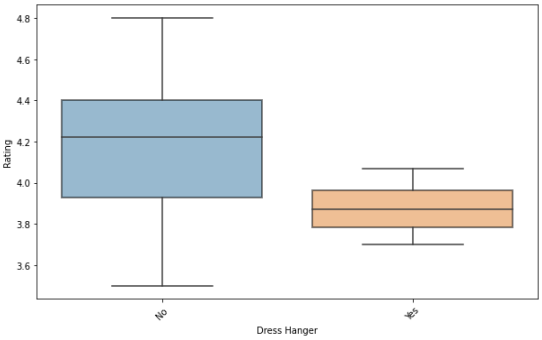

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Bath Tub

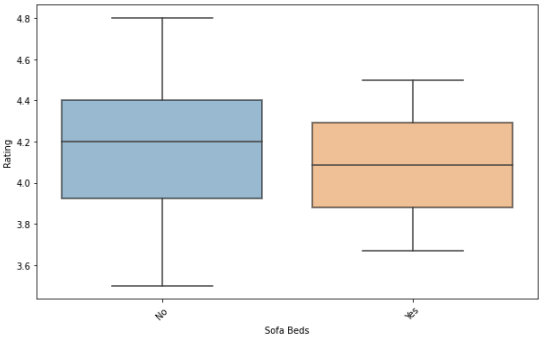

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Banquet Hall

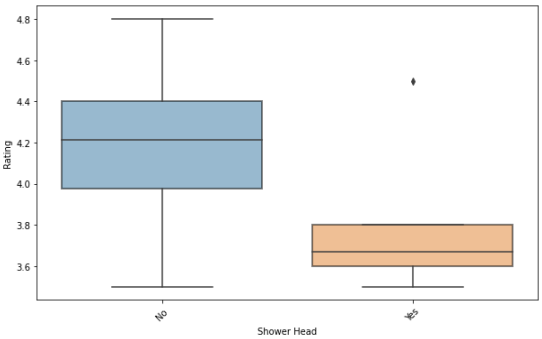

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Twin Single Bed

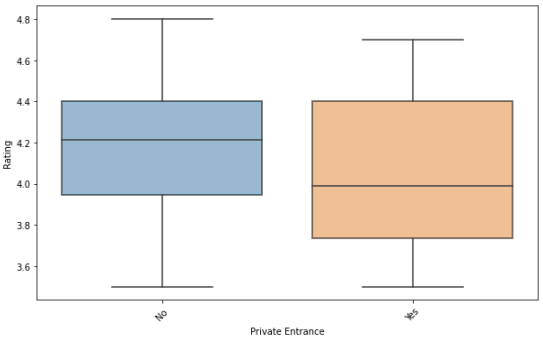

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Queen Sized Bed

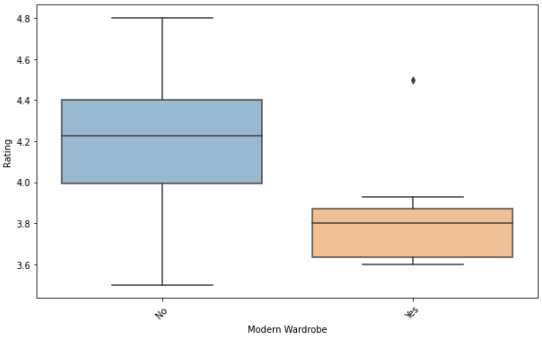

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Hair Dryer

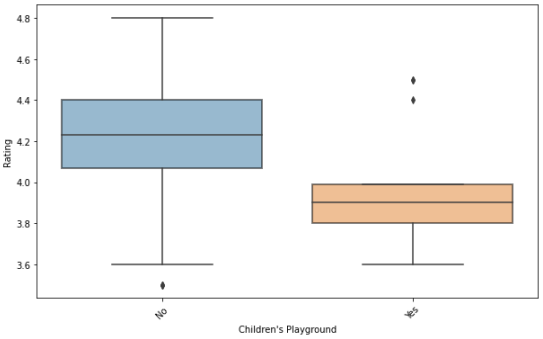

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Dress Hanger

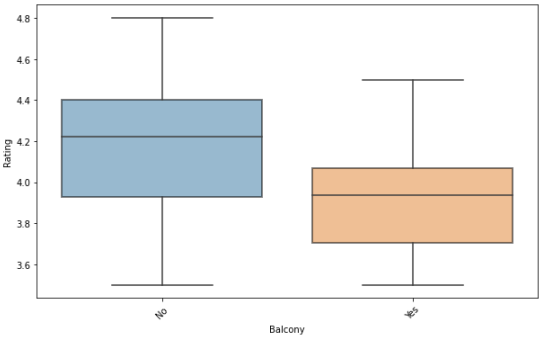

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Sofa Beds

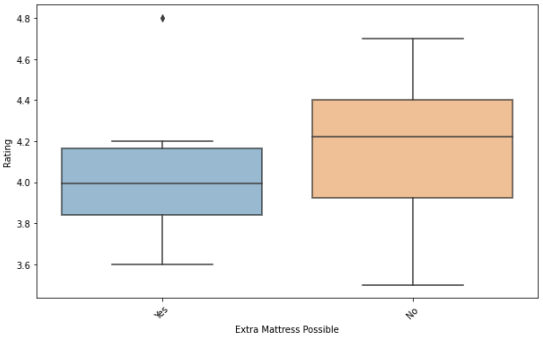

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Shower Head

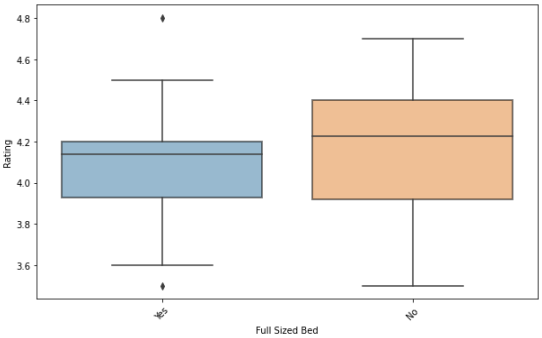

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Private Entrance

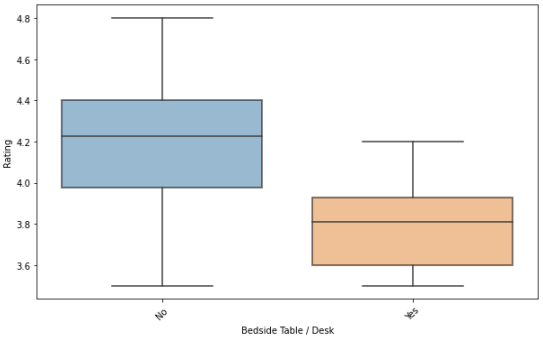

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Modern Wardrobe

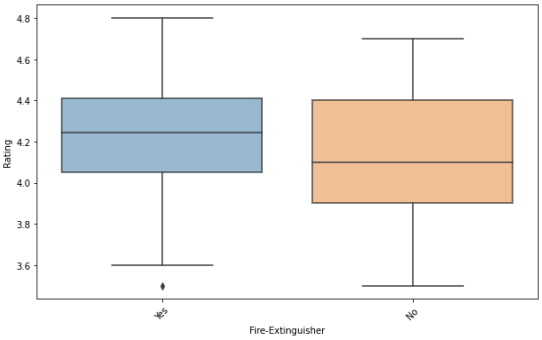

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Children's Playground

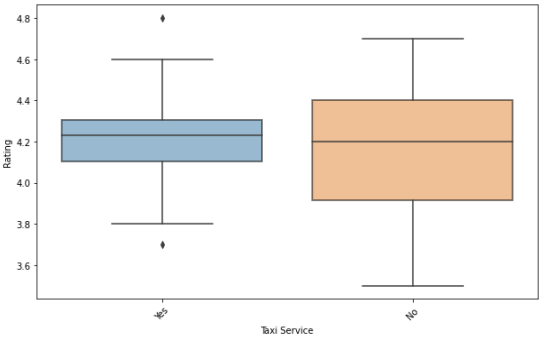

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Balcony

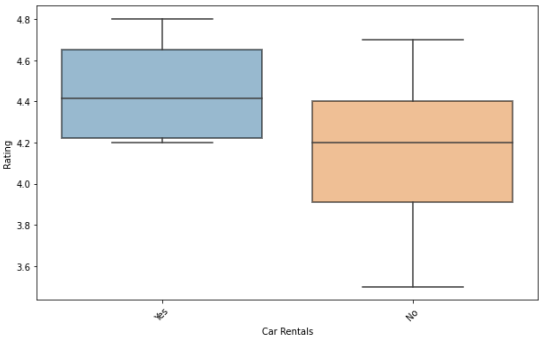

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Extra Mattress Possible

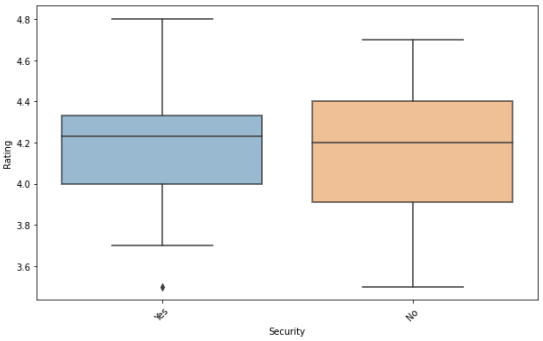

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Full Sized Bed

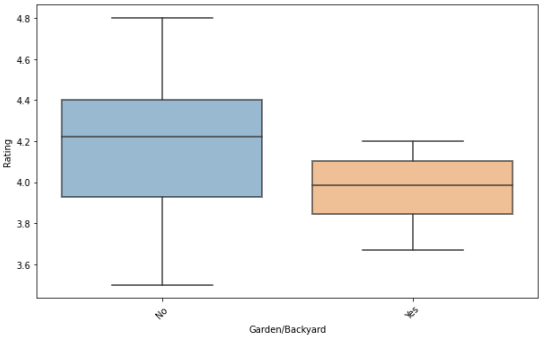

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Bedside Table / Desk

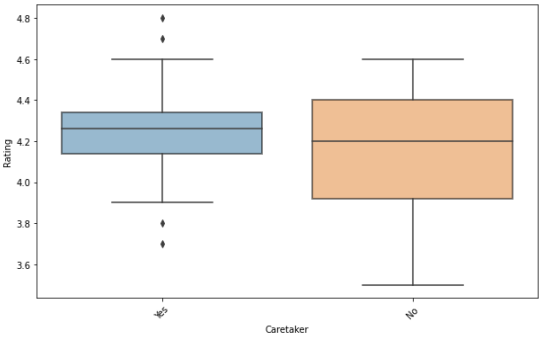

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Fire-Extinguisher

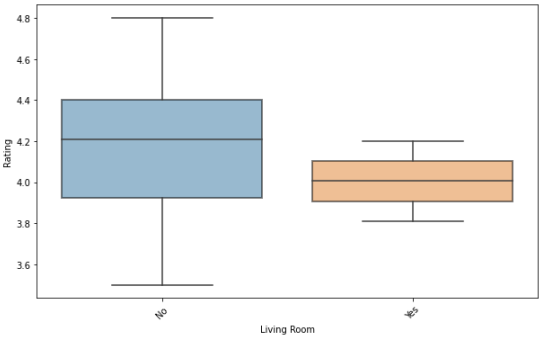

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Taxi Service

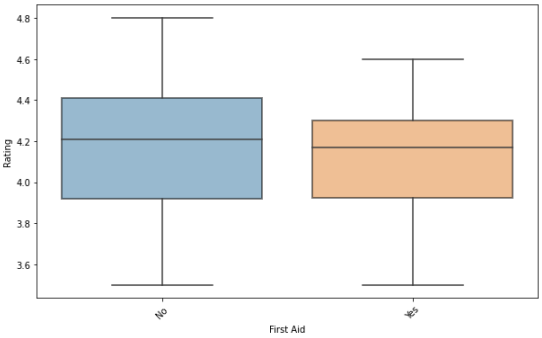

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Car Rentals

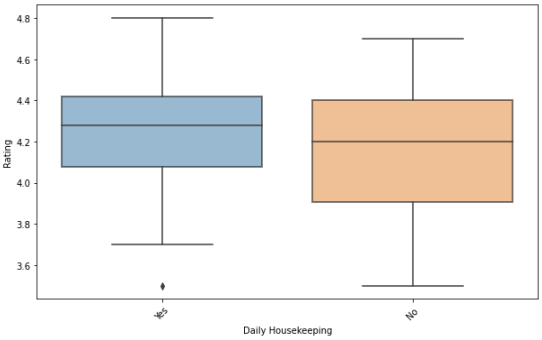

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Security

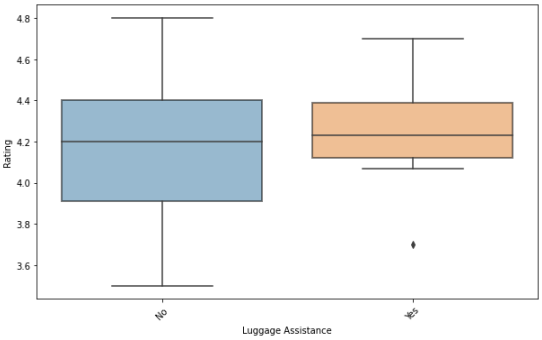

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Garden/Backyard

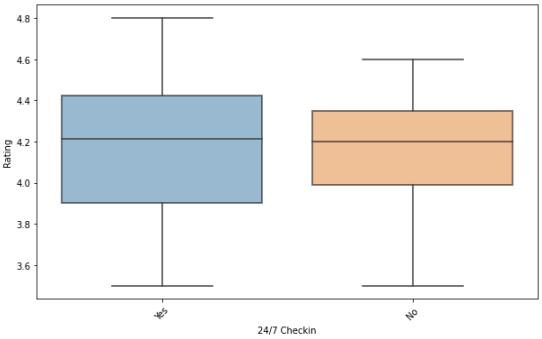

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Caretaker

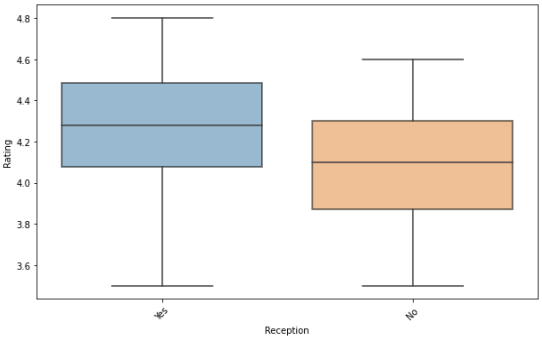

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Living Room

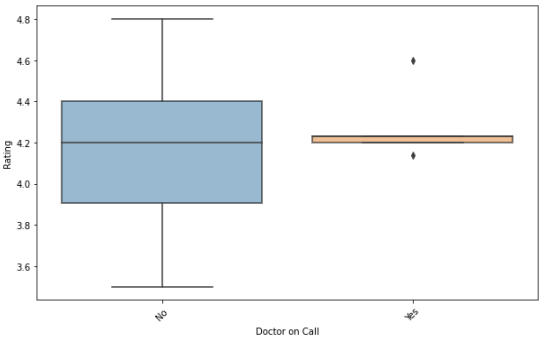

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
First Aid

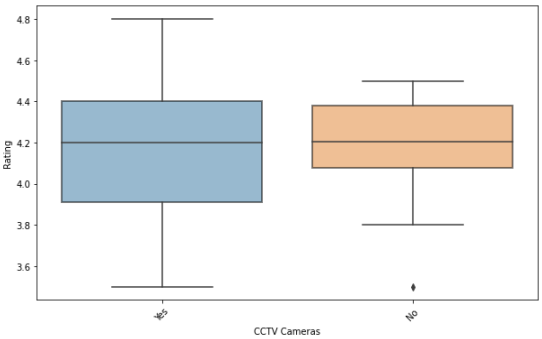

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Daily Housekeeping

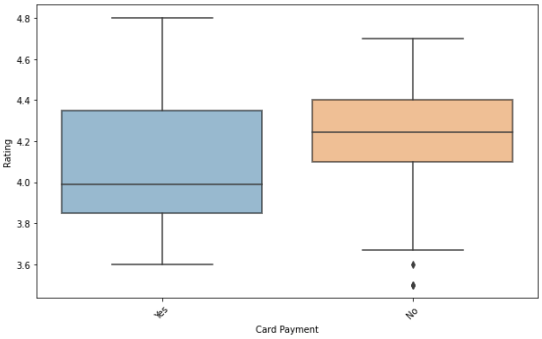

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Luggage Assistance

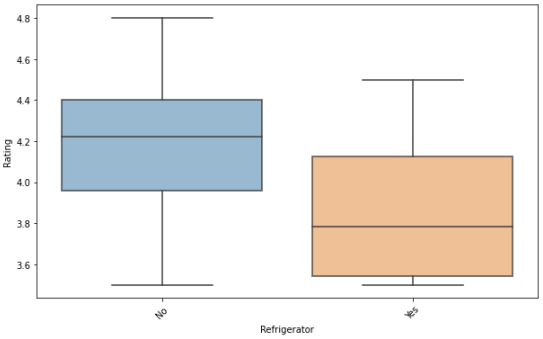

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
24/7 Checkin

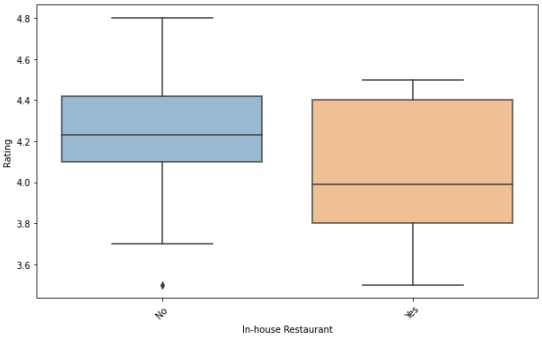

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Reception

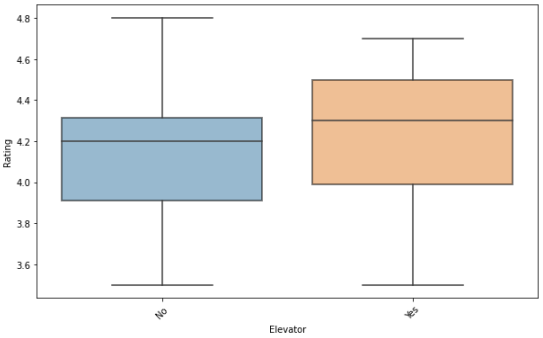

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Doctor on Call


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
CCTV Cameras


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Card Payment


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Refrigerator


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
In-house Restaurant


Rating
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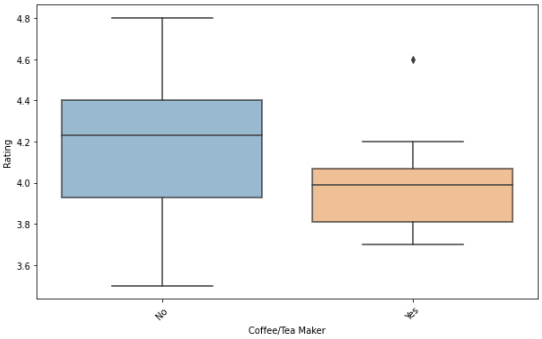
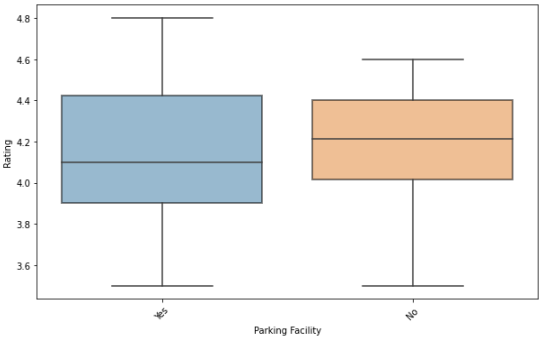
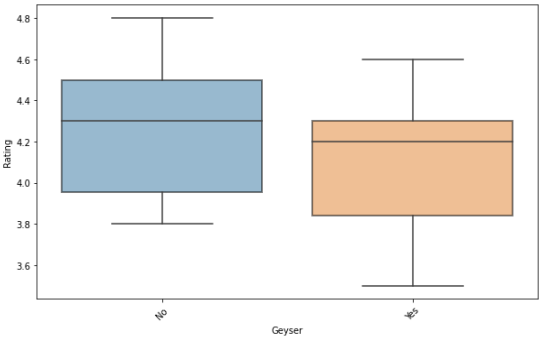
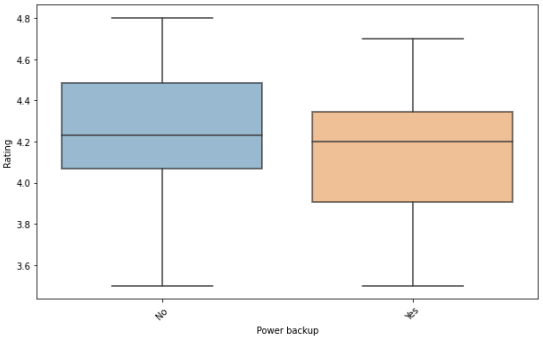
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Elevator


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Coffee/Tea Maker


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Parking Facility


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Geyser


Rating
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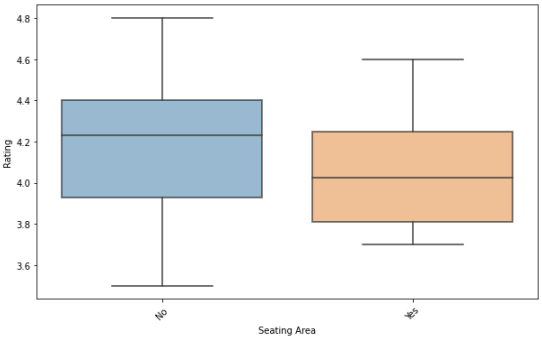
4.4
4.2
4.0
3.8
3.6
No
Yes
Power backup


Rating
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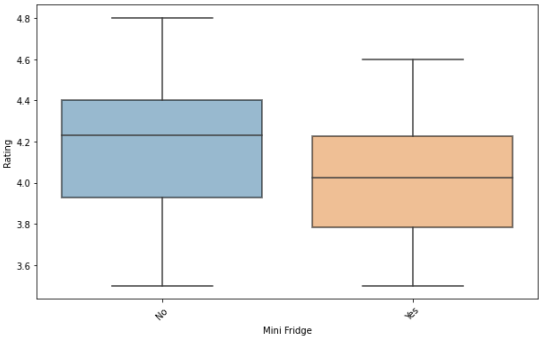
4.2
4.0
3.8
3.6
No
Yes
Seating Area


Rating
4.8
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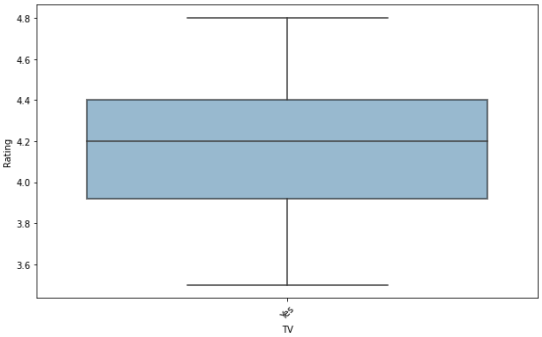
4.4
4.2
4.0
3.8
3.6
No
Yes
Mini Fridge


Rating
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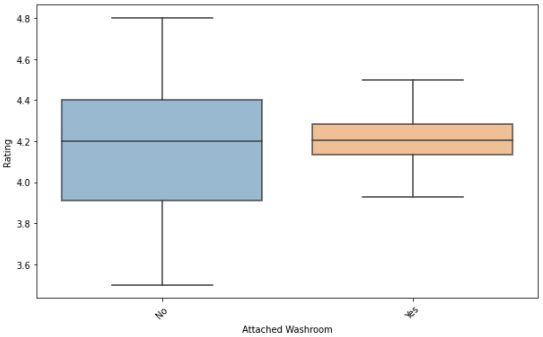
4.4
4.2
4.0
3.8
3.6
Yes
TV


Rating
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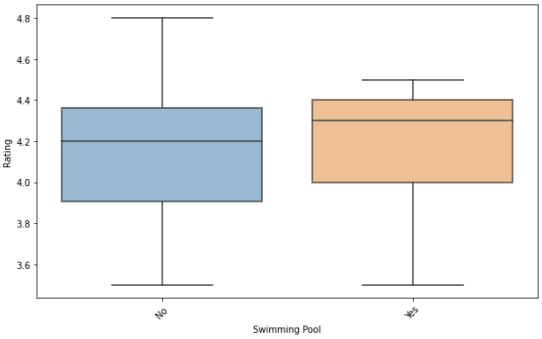
4.4
4.2
4.0
3.8
3.6
No
Yes
Attached Washroom


Rating
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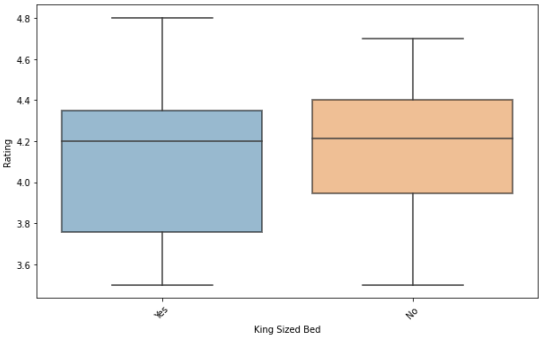
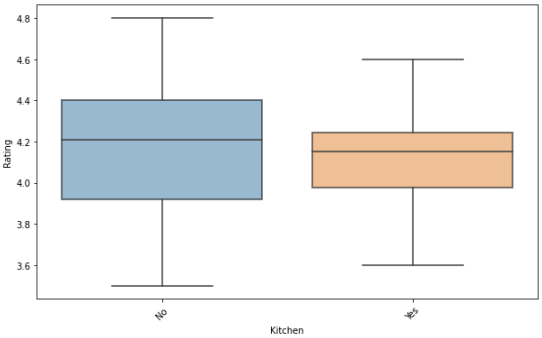
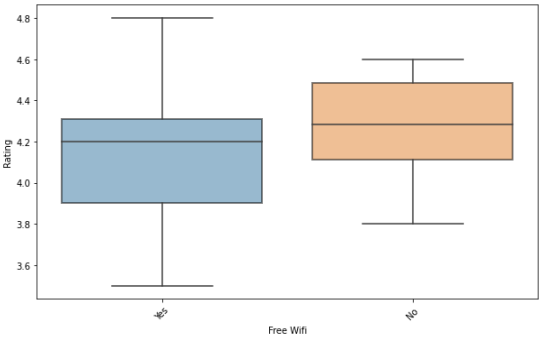
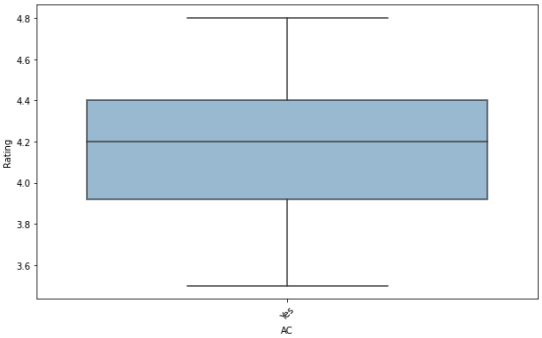
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Swimming Pool


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
King Sized Bed


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Kitchen


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
Free Wifi


Rating
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4.4
4.2
4.0
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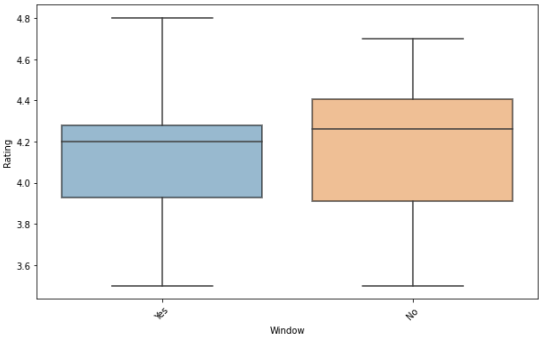
3.6
Yes
AC


Rating
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4.4
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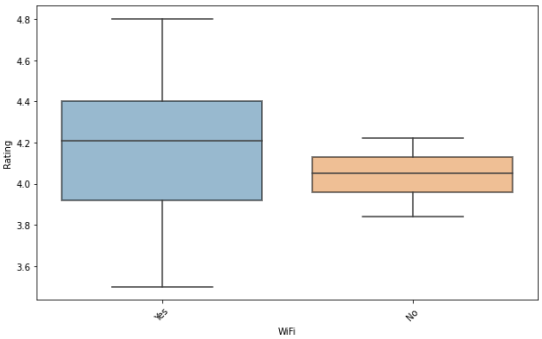
4.0
3.8
3.6
Yes
No
Window


Rating
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4.4
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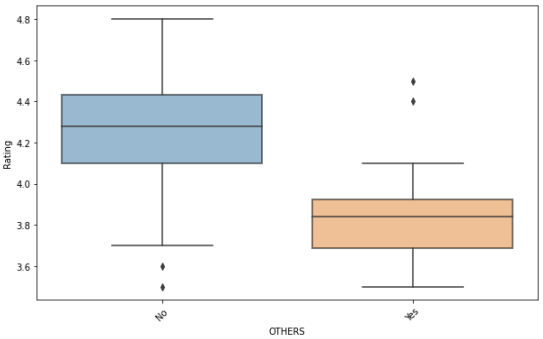
4.0
3.8
3.6
Yes
No
WiFi


Rating
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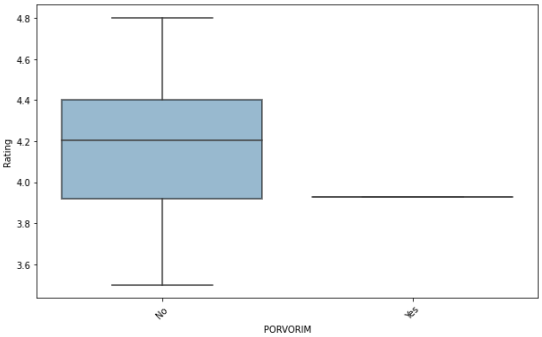
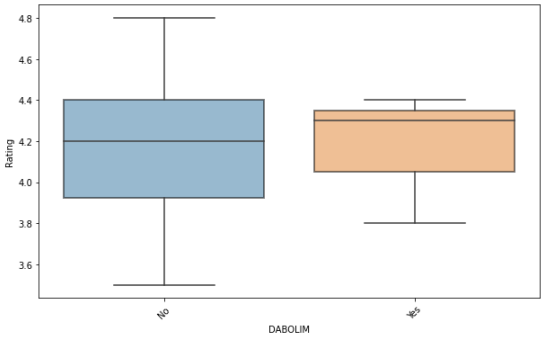
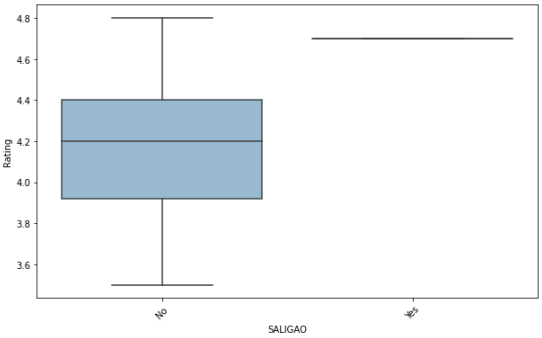
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
OTHERS


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
PORVORIM


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
DABOLIM


Rating
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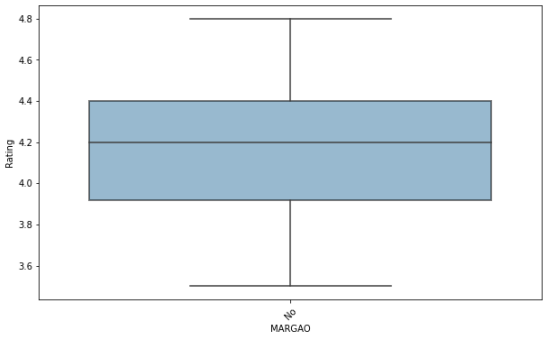
4.4
4.2
4.0
3.8
3.6
No
Yes
SALIGAO


Rating
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4.4
4.2
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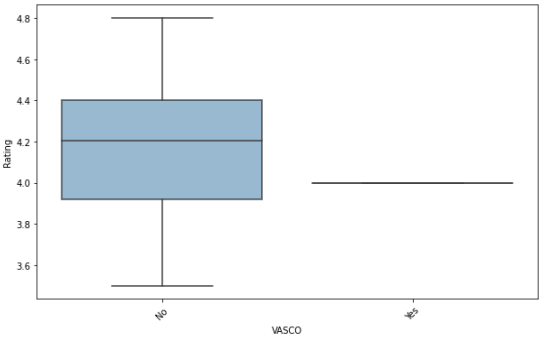
3.8
3.6
No
MARGAO


Rating
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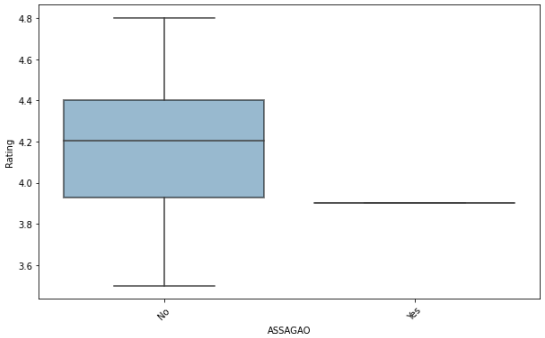
4.4
4.2
4.0
3.8
3.6
No
Yes
VASCO


Rating
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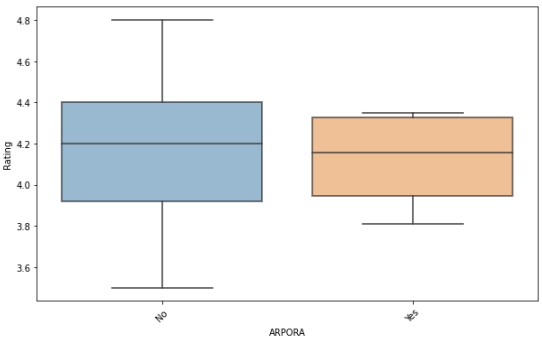
4.4
4.2
4.0
3.8
3.6
No
Yes
ASSAGAO


Rating
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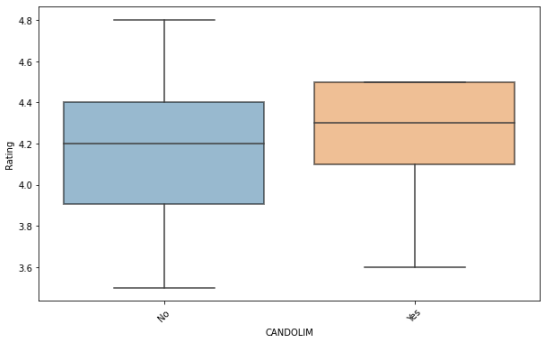
4.4
4.2
4.0
3.8
3.6
No
Yes
ARPORA


Rating
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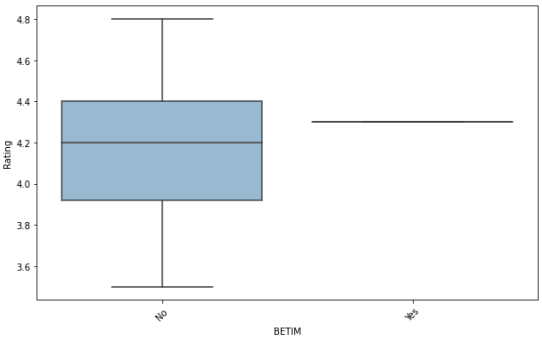
4.4
4.2
4.0
3.8
3.6
No
Yes
CANDOLIM


Rating
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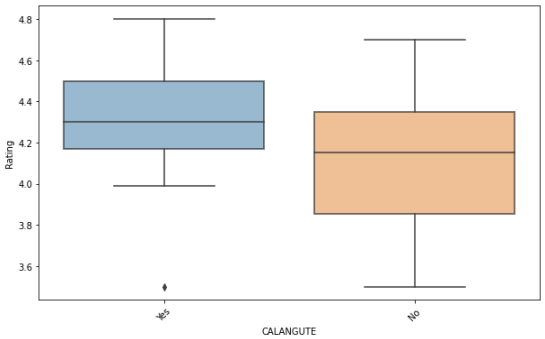
4.4
4.2
4.0
3.8
3.6
No
Yes
BETIM


Rating
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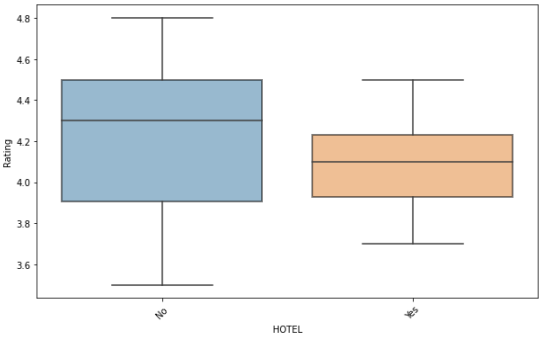
4.4
4.2
4.0
3.8
3.6
Yes
No
CALANGUTE


Rating
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4.4
4.2
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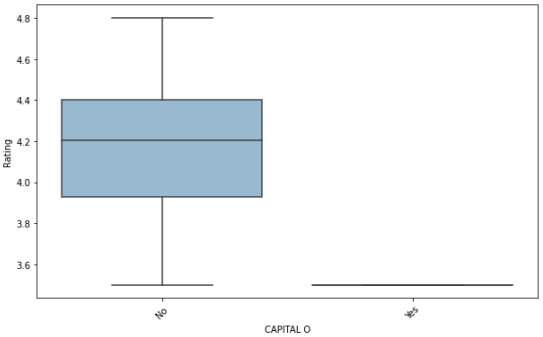
3.6
No
Yes
HOTEL


Rating
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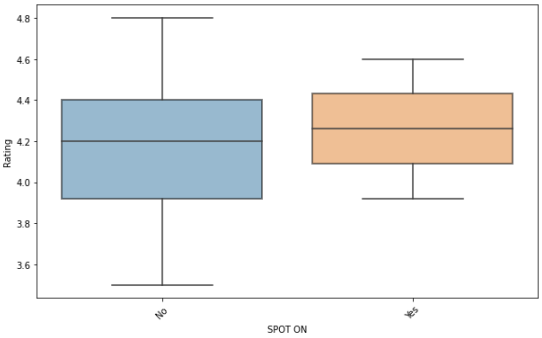
3.6
No
Yes
CAPITAL O


Rating
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4.4
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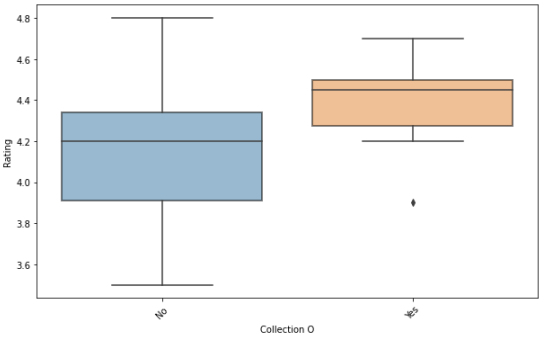
3.8
3.6
No
Yes
SPOT ON


Rating
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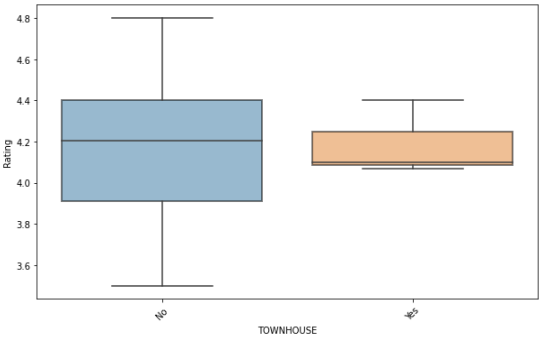
No
Yes
Collection O


Rating
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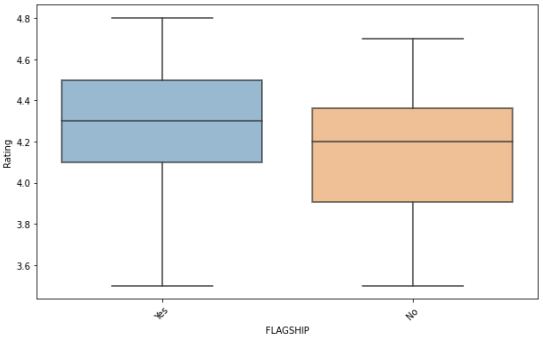
3.6
No
Yes
TOWNHOUSE


Rating
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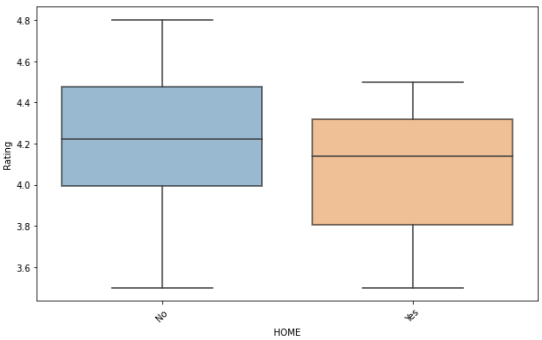
4.4
4.2
4.0
3.8
3.6
Yes
No
FLAGSHIP


Rating
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4.4
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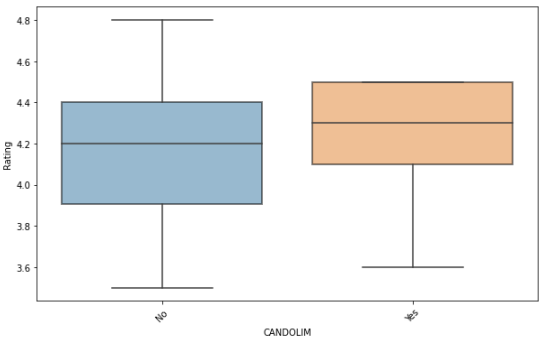
3.6
No
Yes
HOME


Rating
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4.4
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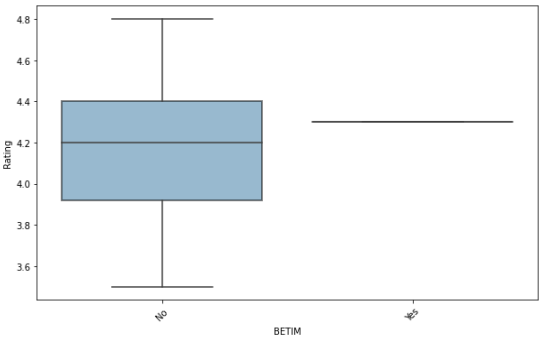
3.6
No
Yes
CANDOLIM


Rating
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4.4
4.2
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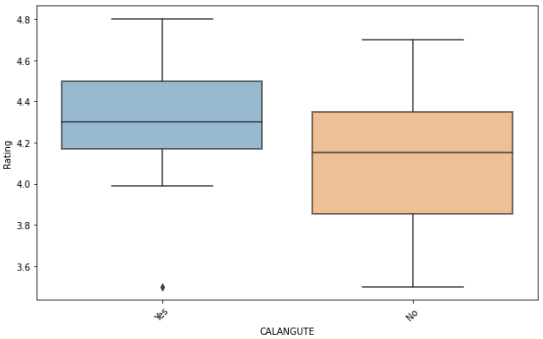
No
Yes
BETIM


Rating
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4.4
4.2
4.0
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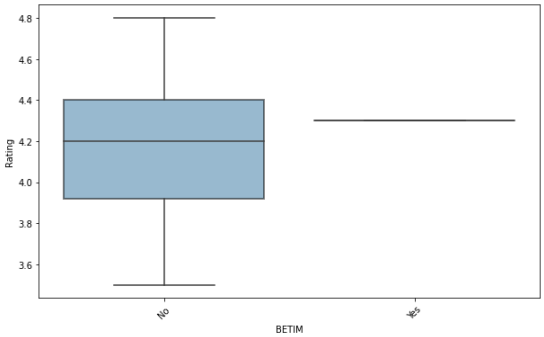
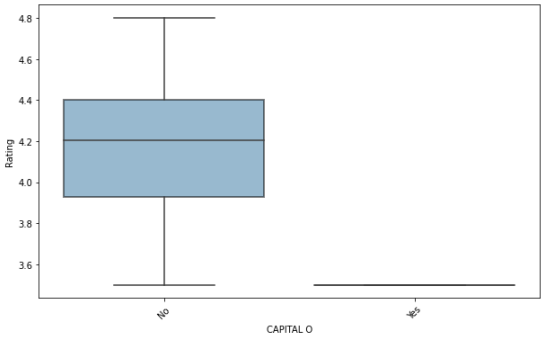
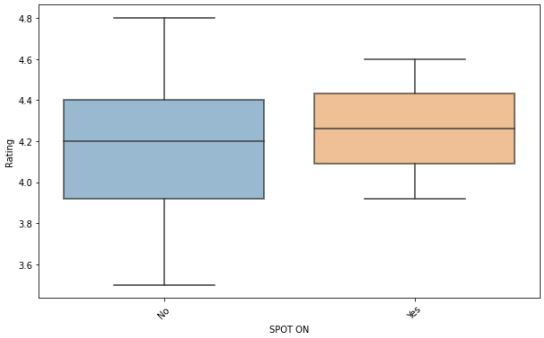
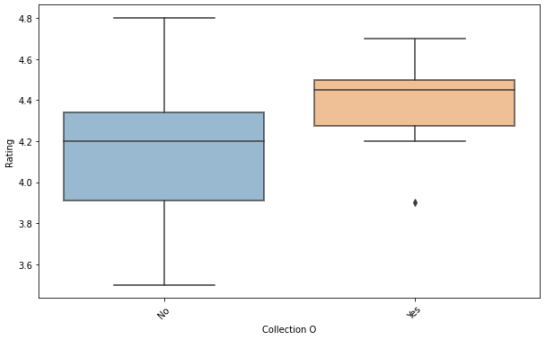
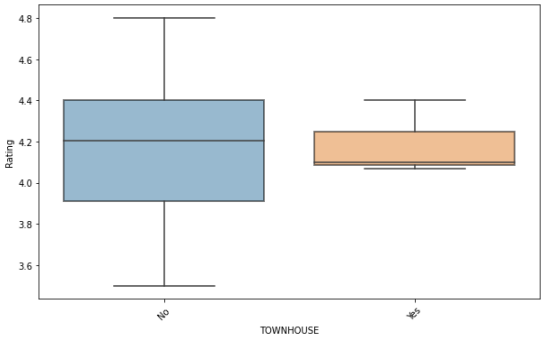
3.6
Yes
No
CALANGUTE

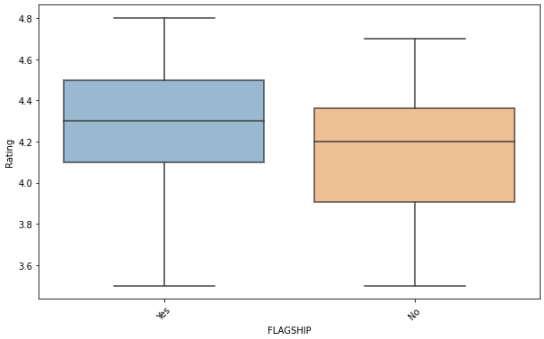


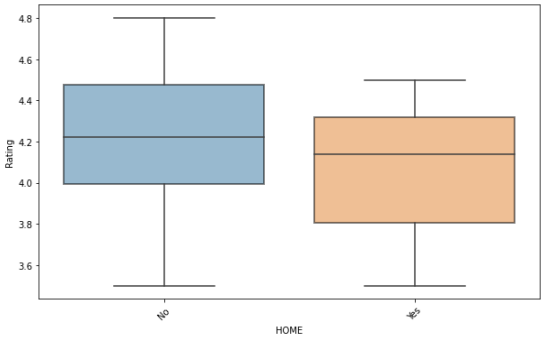


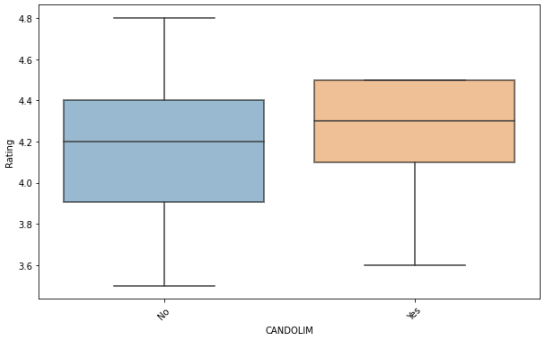


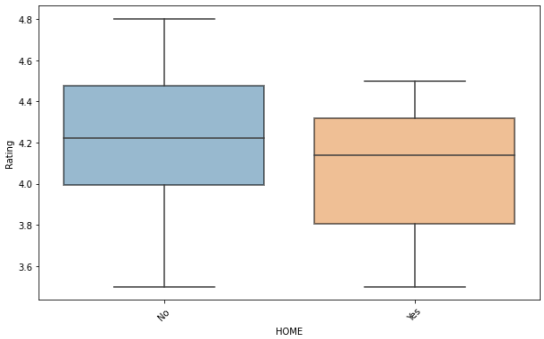






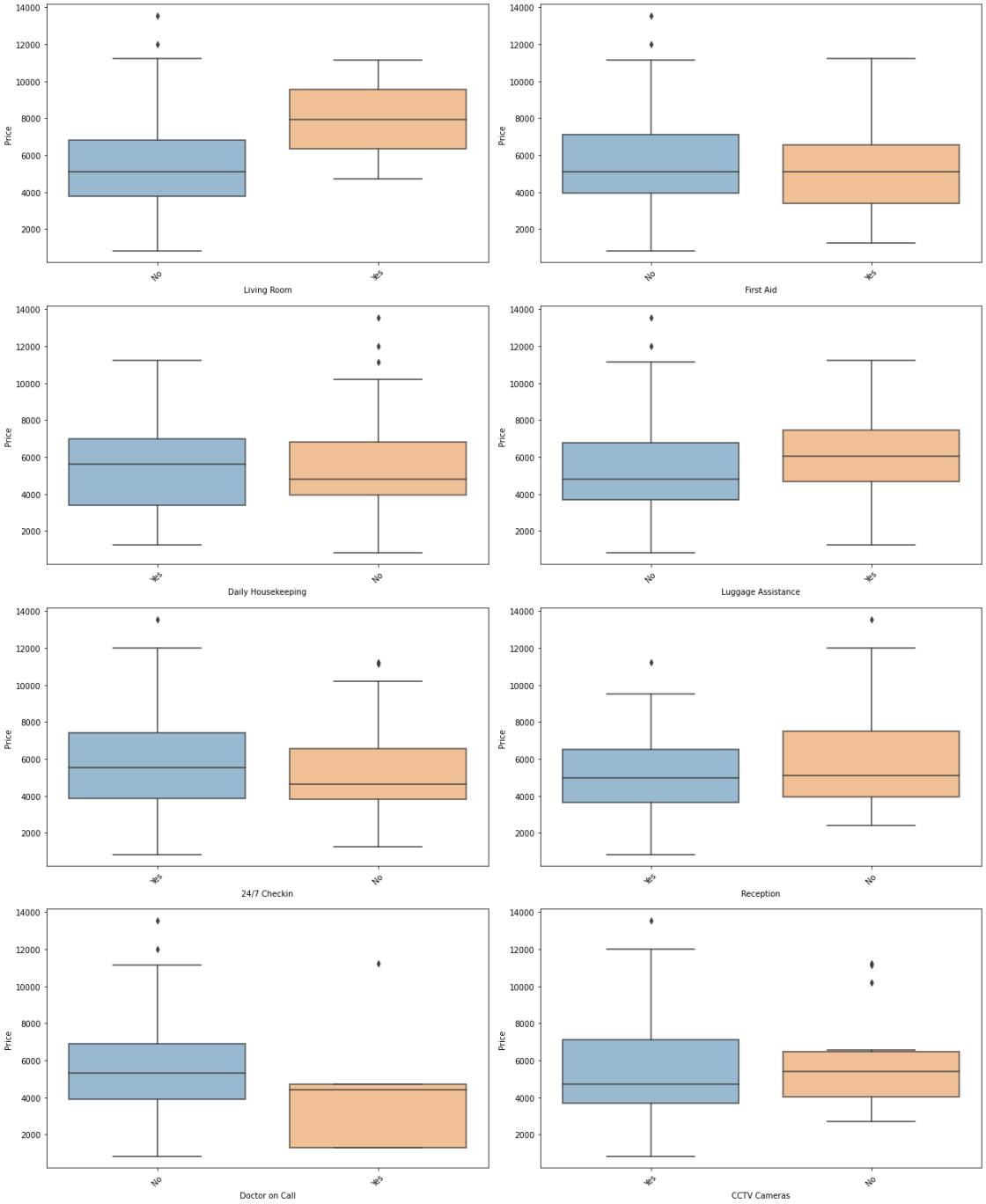


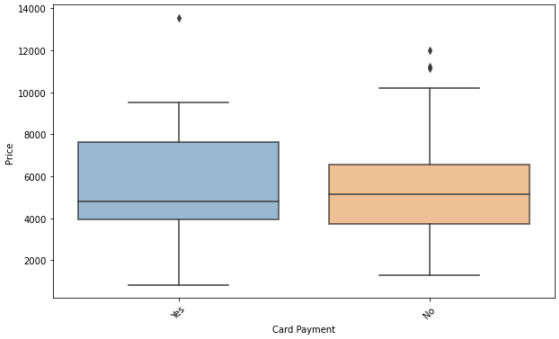




#Boxplots With Y axis as Price

```
for i in range(72):
    plt.figure(figsize = (10, 6))
    ax = sns.boxplot(x=df_categ2.iloc[:,i], y=df['Price'], data=df_categ2)
    plt.setp(ax.artists, alpha=.5, linewidth=2, edgecolor="k")
    plt.xticks(rotation=45)
```

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No
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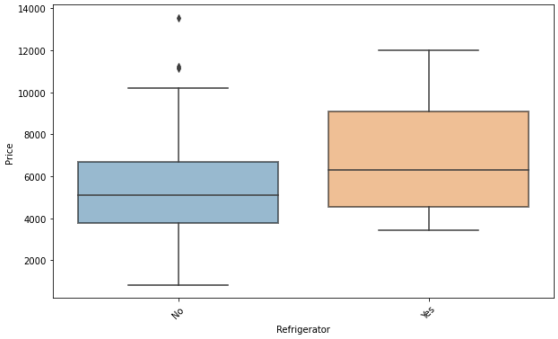
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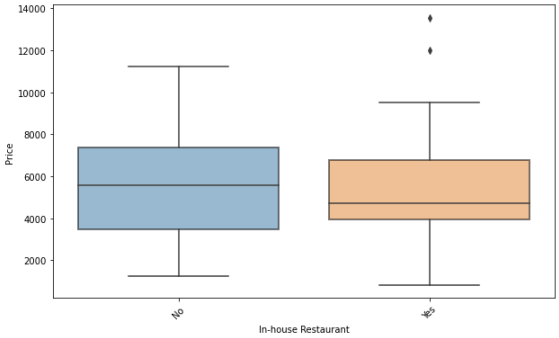
Yes
Refrigerator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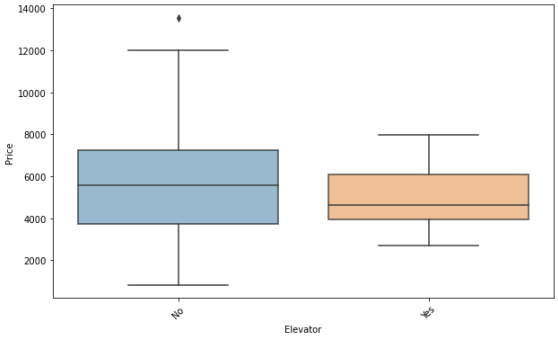
Yes
In-house Restaurant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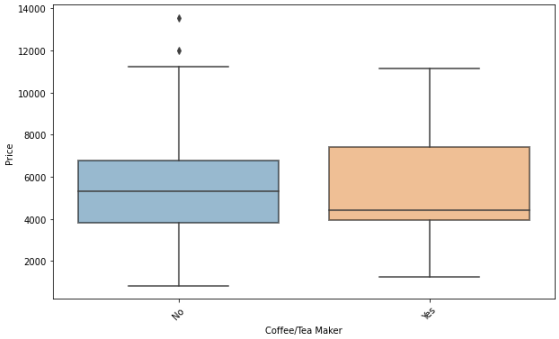
Yes
Elevator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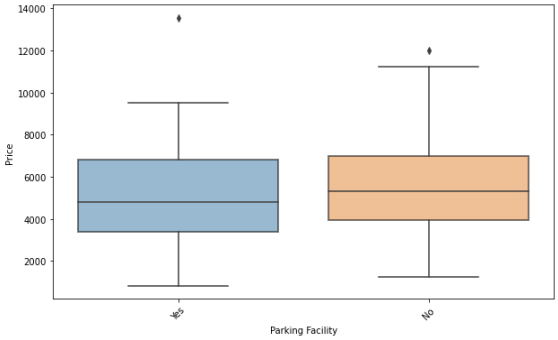
No
Yes
Coffee/Tea Maker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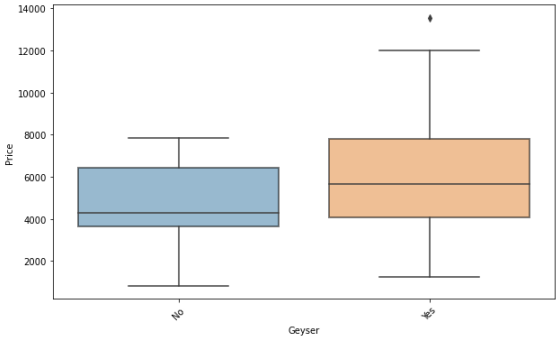
Yes
No
Parking Facility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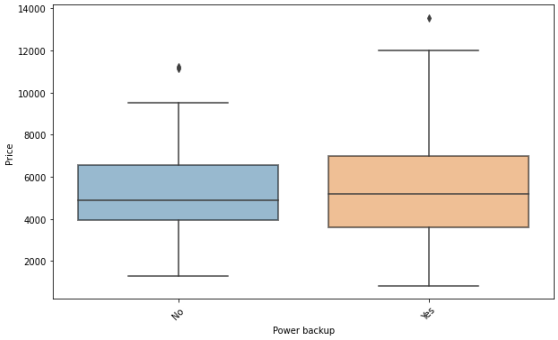
No
Yes
Geyser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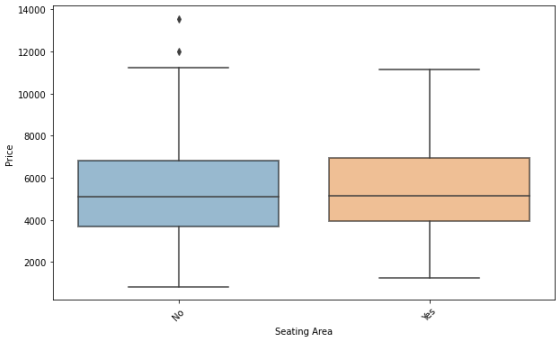
No
Yes
Power backup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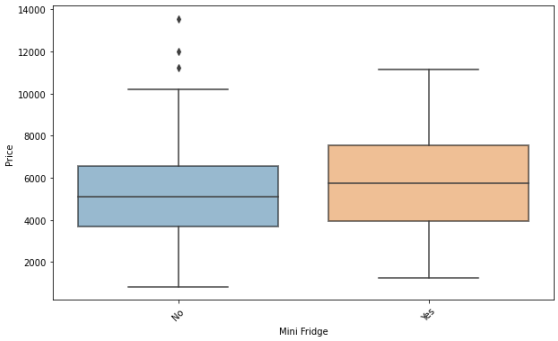
No
Yes
Seating Area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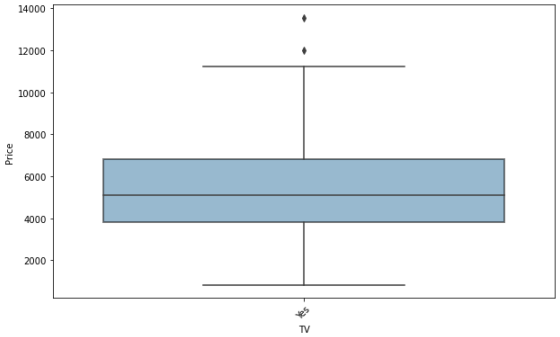
No
Yes
Mini Fridge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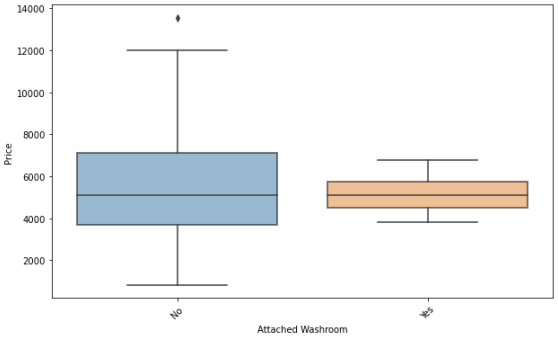
Yes
TV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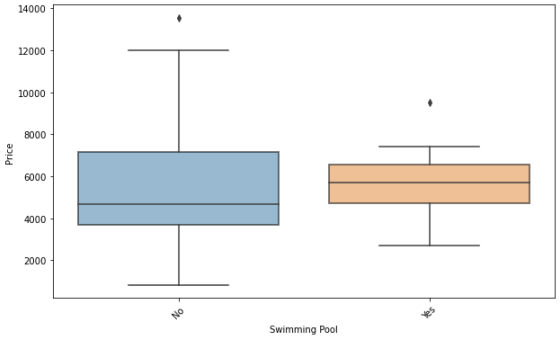
No
Yes
Attached Washroom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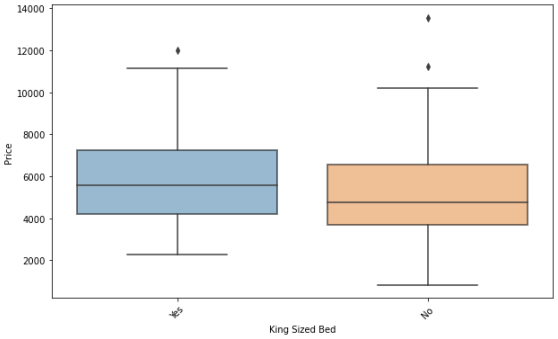
No
Yes
Swimming Pool


Price
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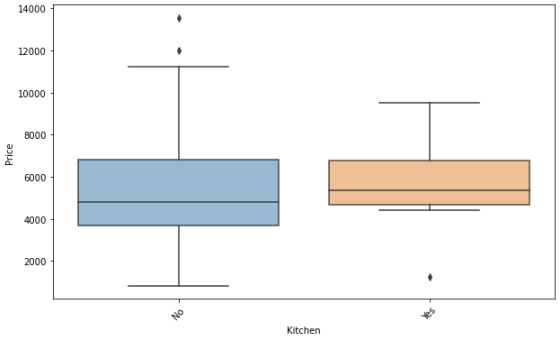
Yes
No
King Sized Bed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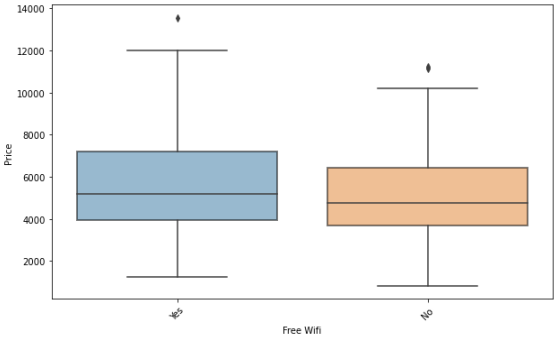
No
Yes
Kitchen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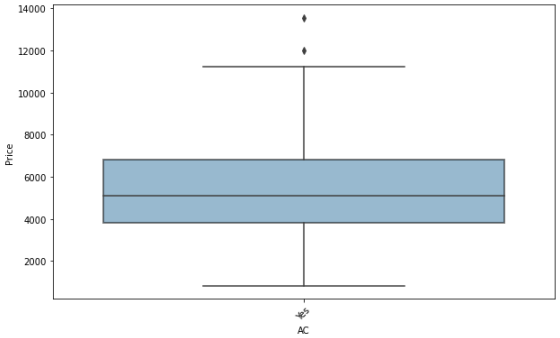
Yes
No
Free Wifi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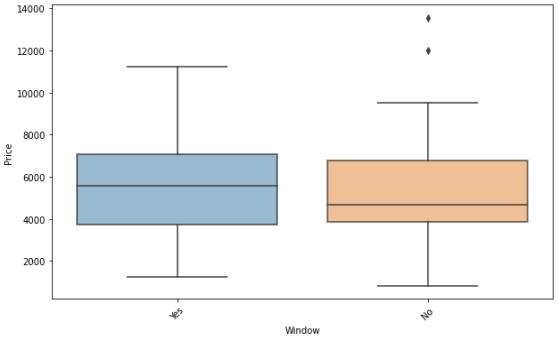
AC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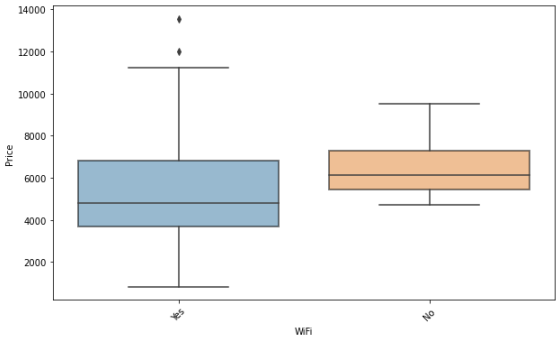
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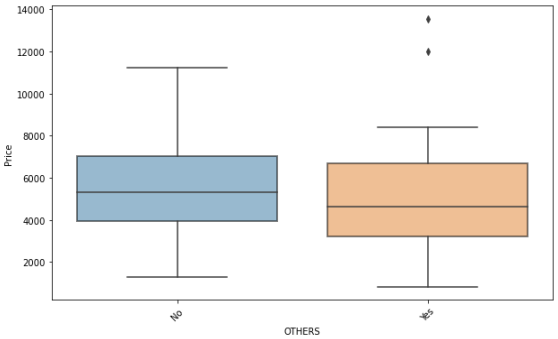
WiFi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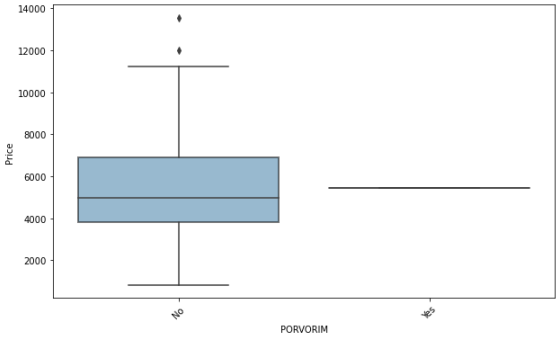
OTHERS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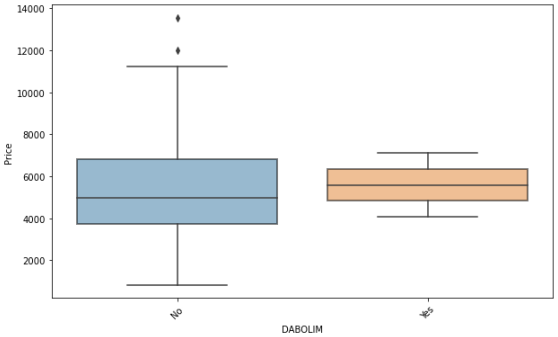
PORVORIM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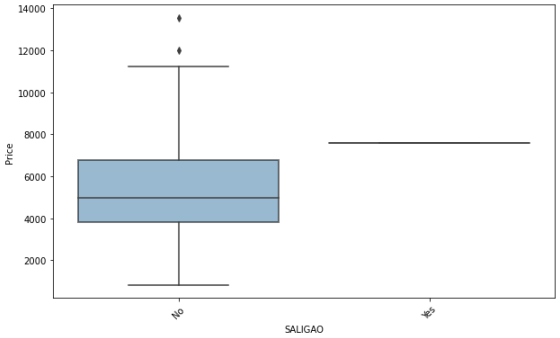
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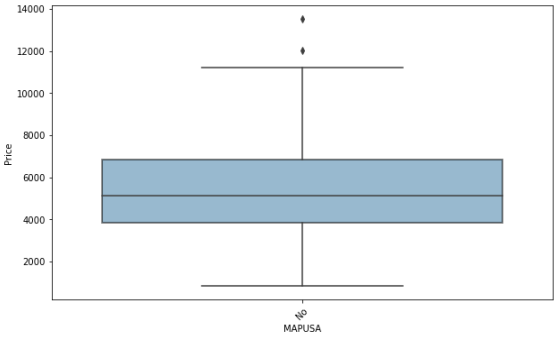
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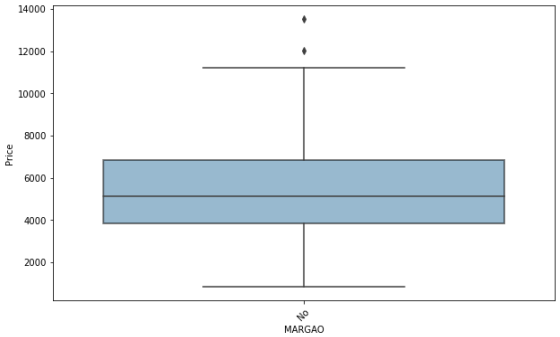
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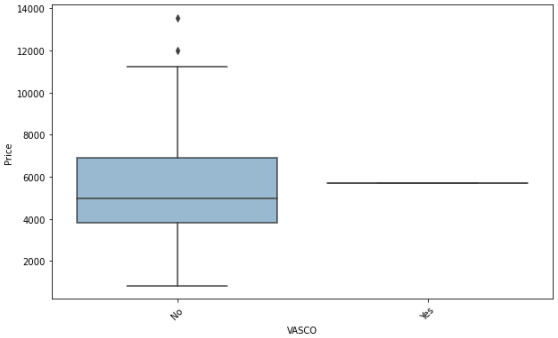
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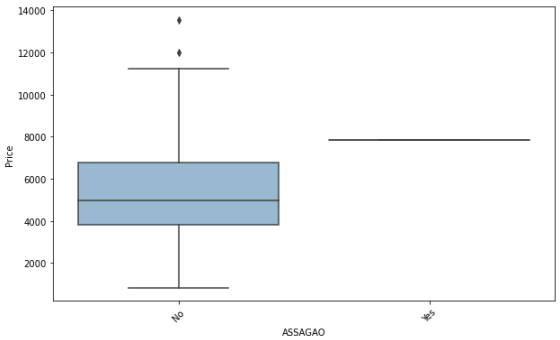
VASCO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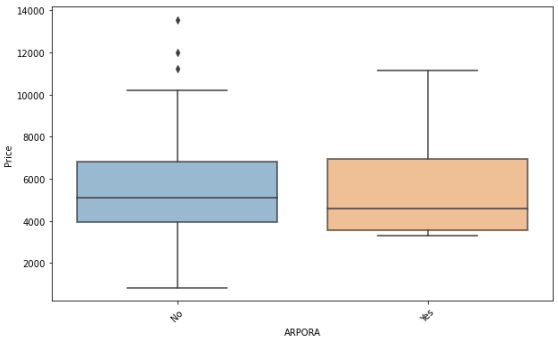
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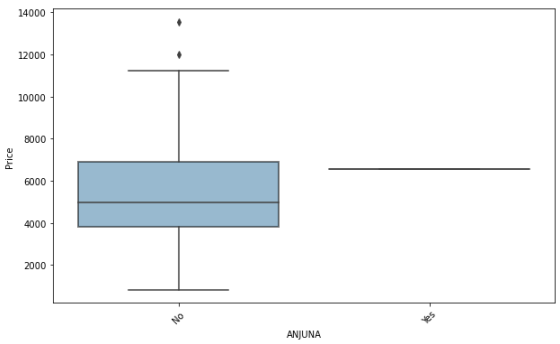
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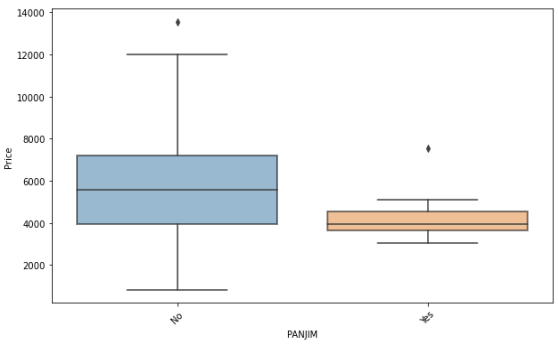
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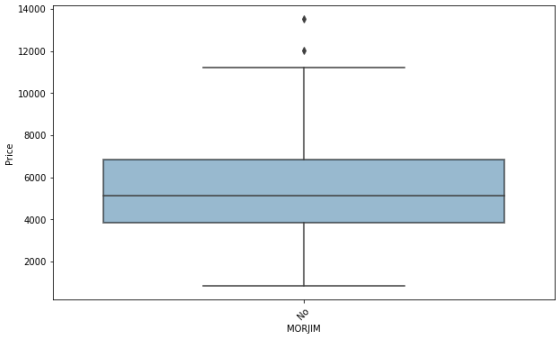
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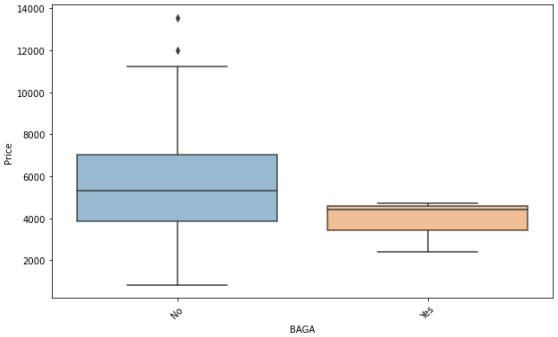
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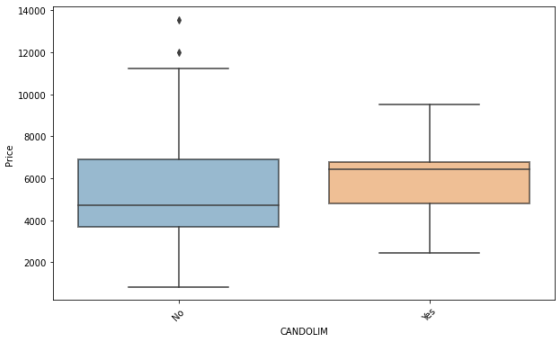
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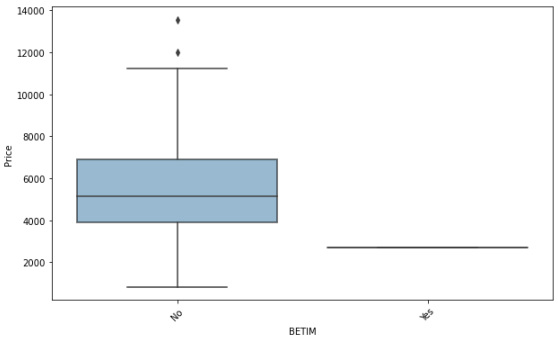
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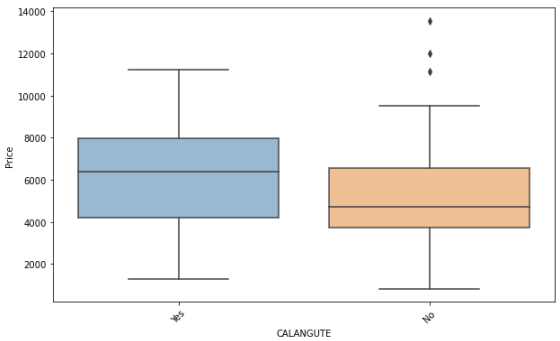
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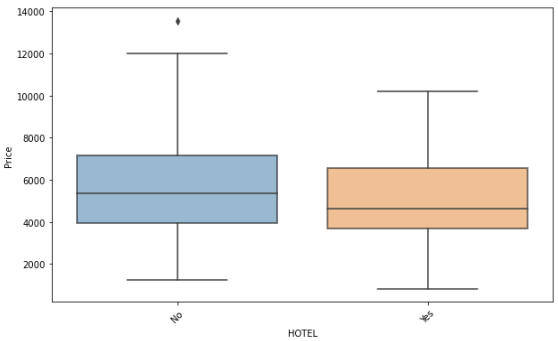
CALANGUTE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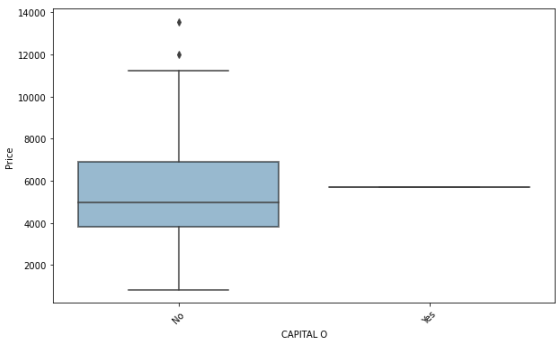
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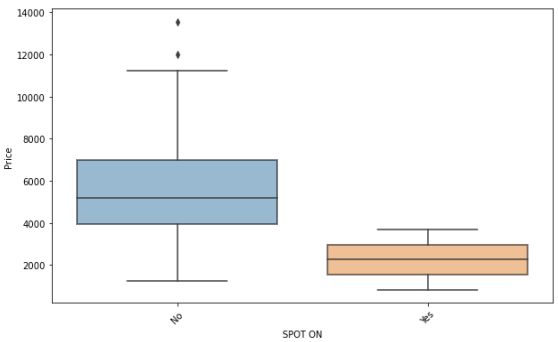
CAPITAL O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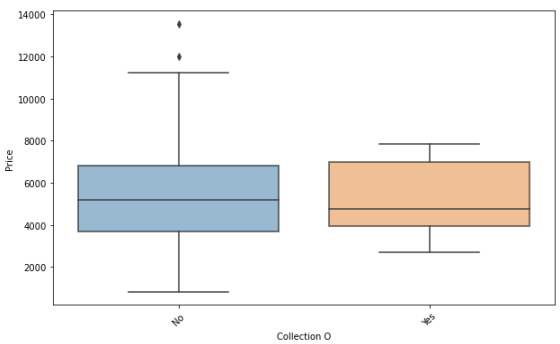
SPOT ON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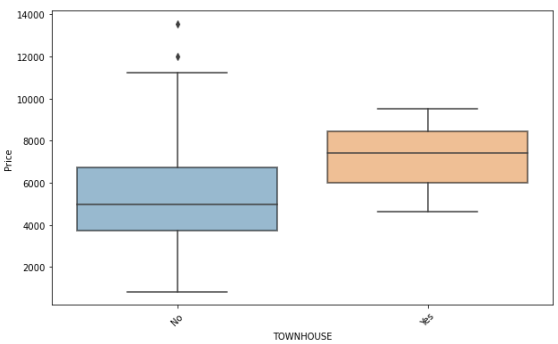
Collection O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No
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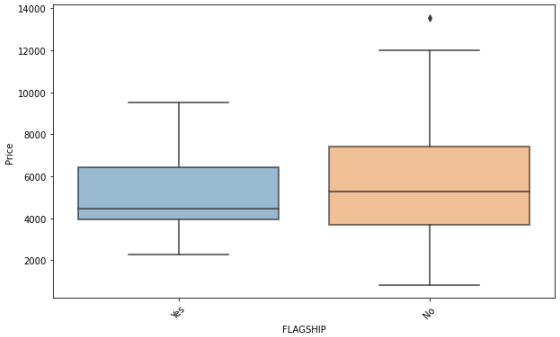
TOWNHOUSE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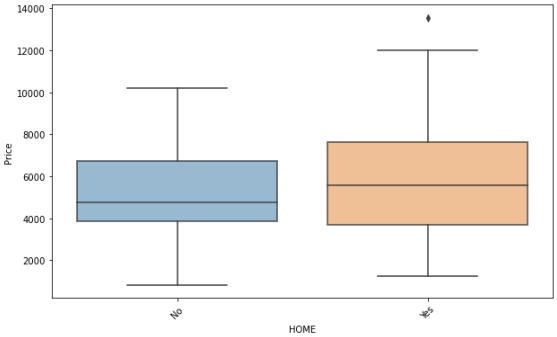
FLAGSHIP


Price
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No
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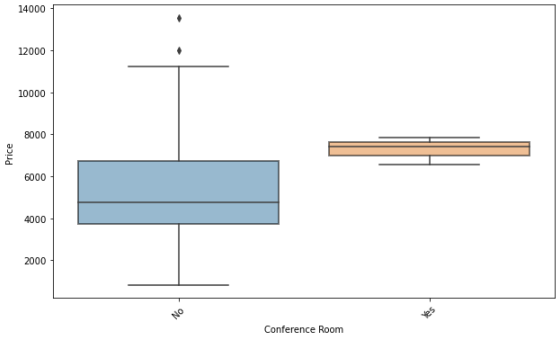
HOME


Price
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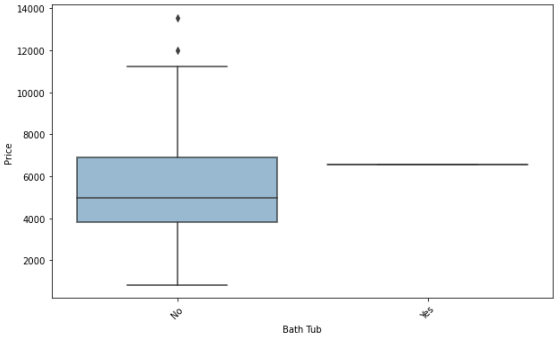
No
Yes
Conference Room


Price
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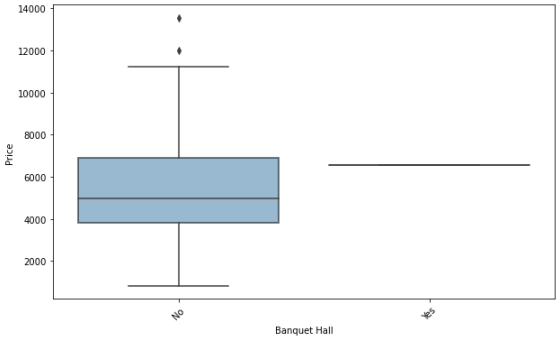
No
Yes
Bath Tub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No
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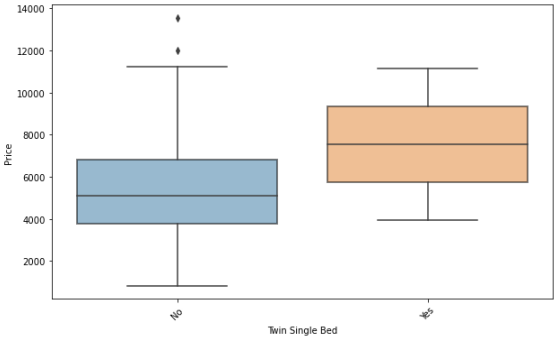
Banquet Hall


Price
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No
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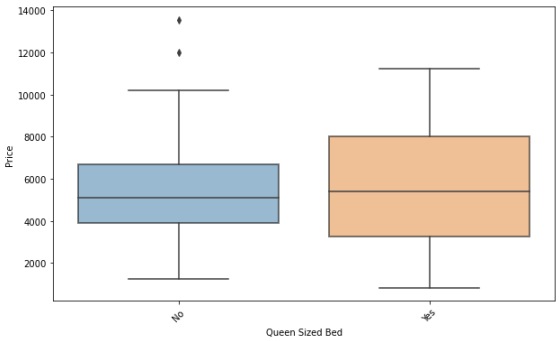
Twin Single Bed


Price
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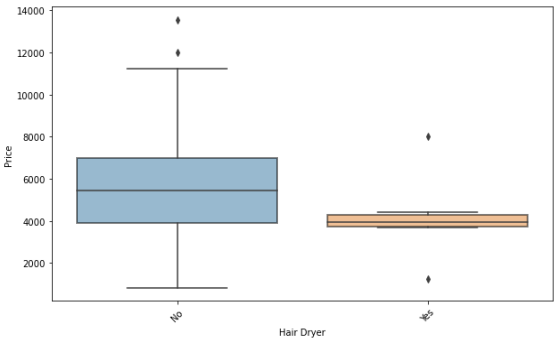
No
Yes
Queen Sized Bed


Price
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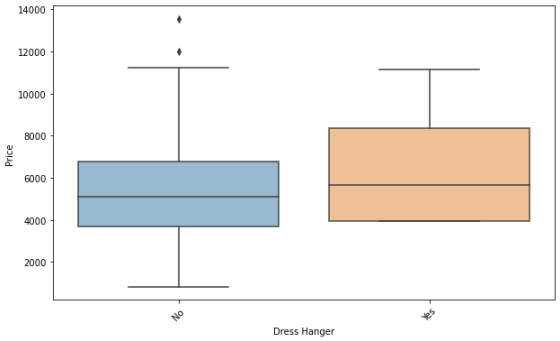
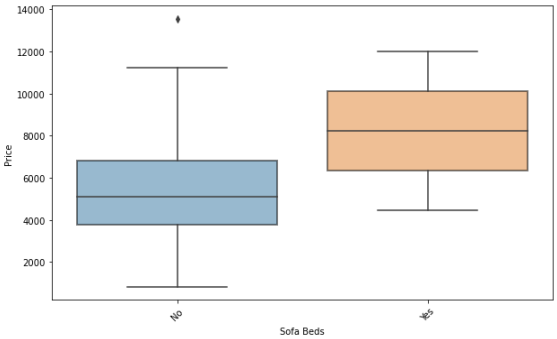
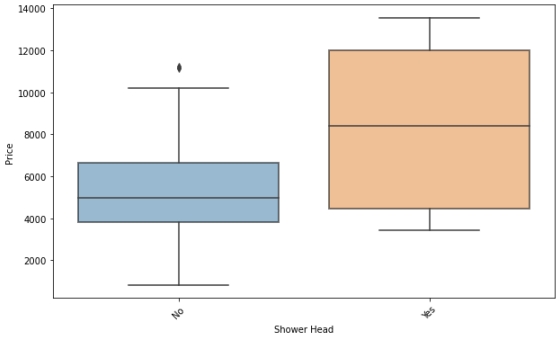
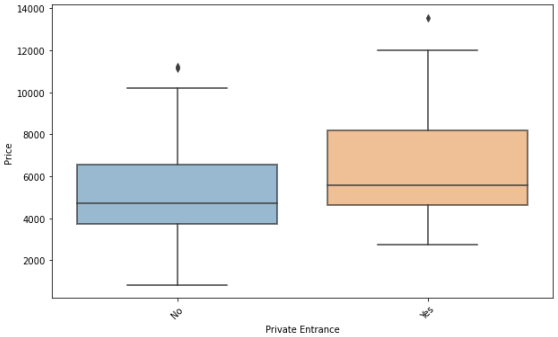
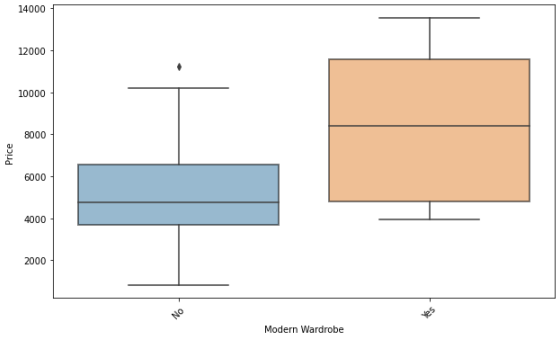
No
Yes
Hair Dryer

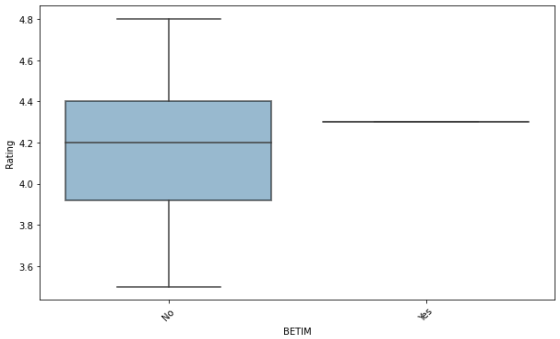

Price
14000
12000
10000
8000
6000
4000
2000
No
Yes
Dress Hanger

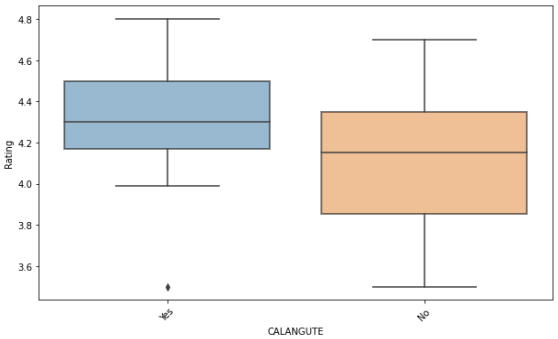

Price
14000
12000
10000
8000
6000
4000
2000
No
Yes
Sofa Beds

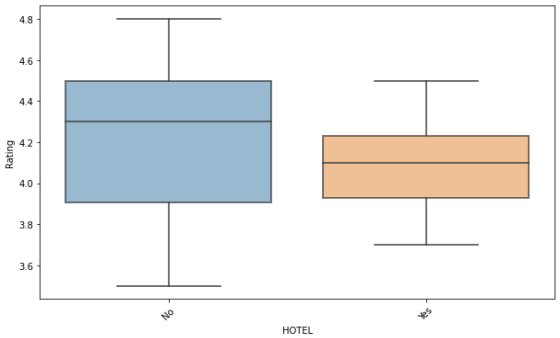

Price
14000
12000
10000
8000
6000
4000
2000
No
Yes
Shower Head

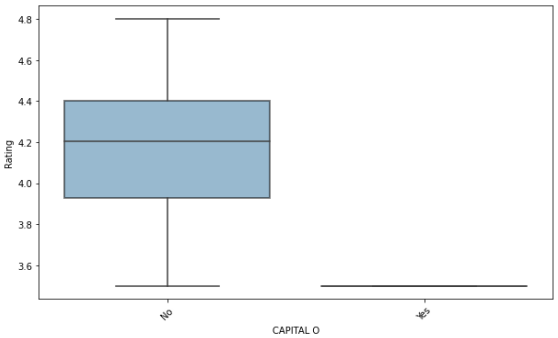

Price
14000
12000
10000
8000
6000
4000
2000
No
Yes
Private Entrance

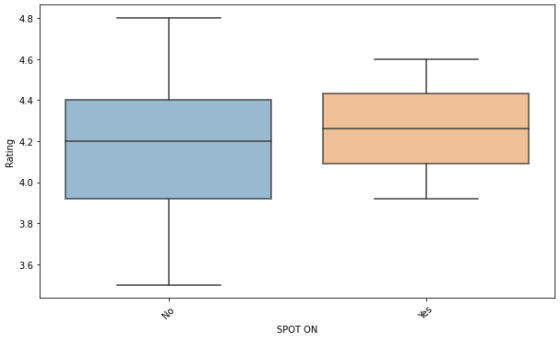

Price
14000
12000
10000
8000
6000
4000
2000
No
Yes
Modern Wardrobe

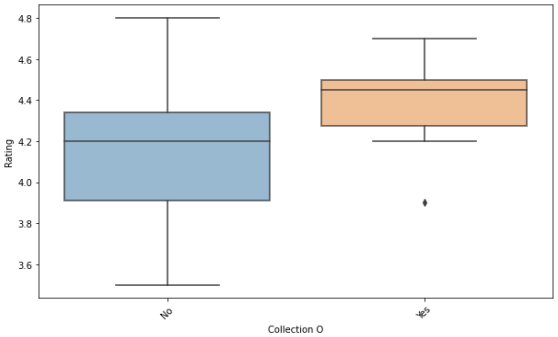

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
BETIM

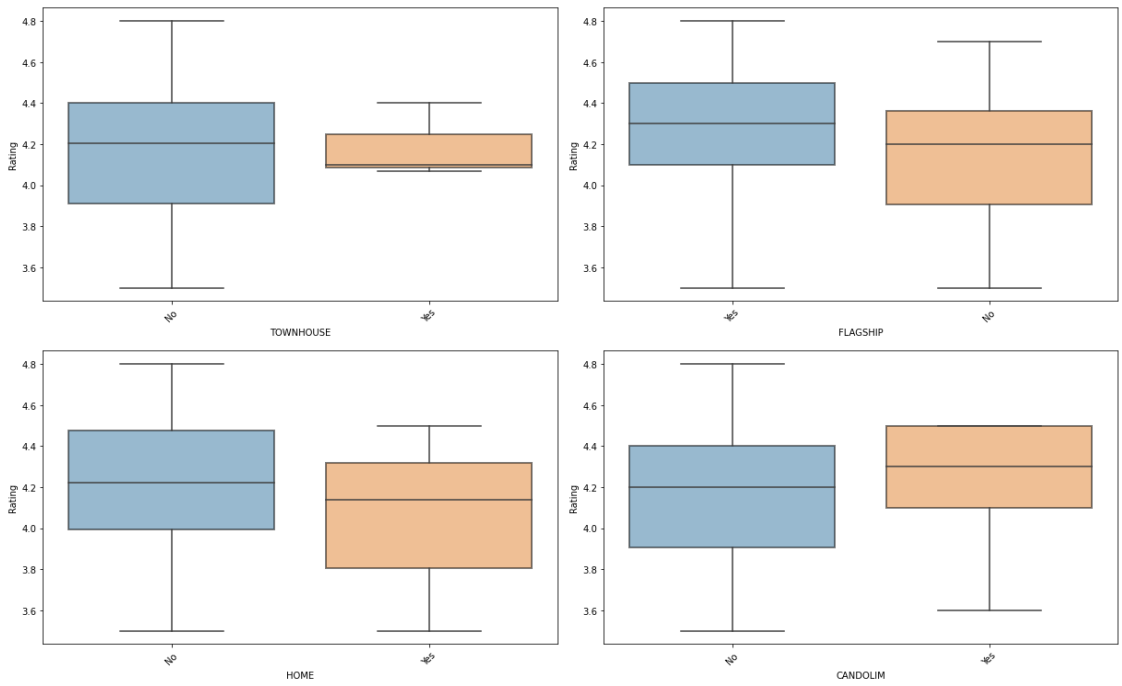

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
Yes
No
CALANGUTE


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
HOTEL

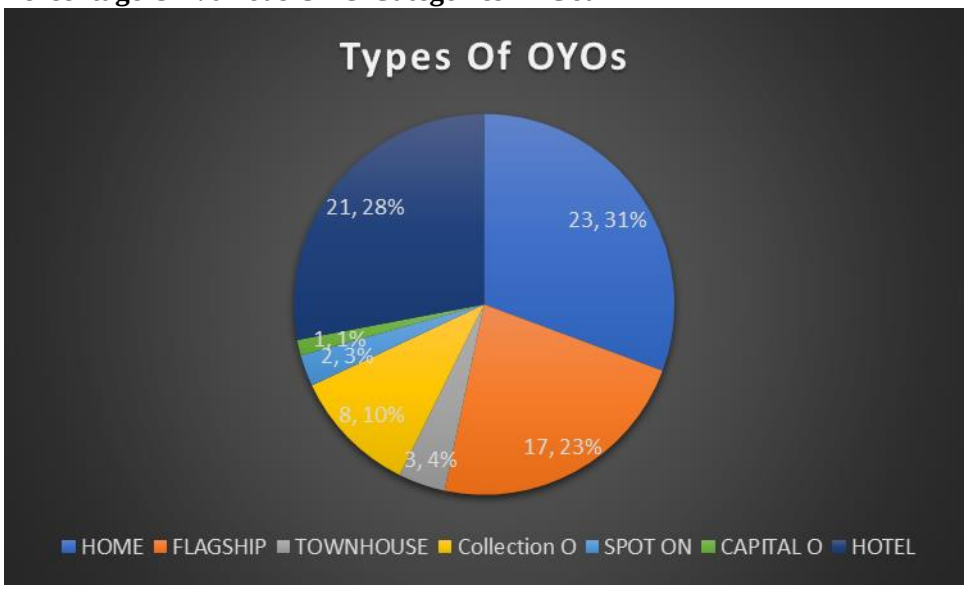

Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
CAPITAL O


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
SPOT ON


Rating
4.8
4.6
4.4
4.2
4.0
3.8
3.6
No
Yes
Collection O

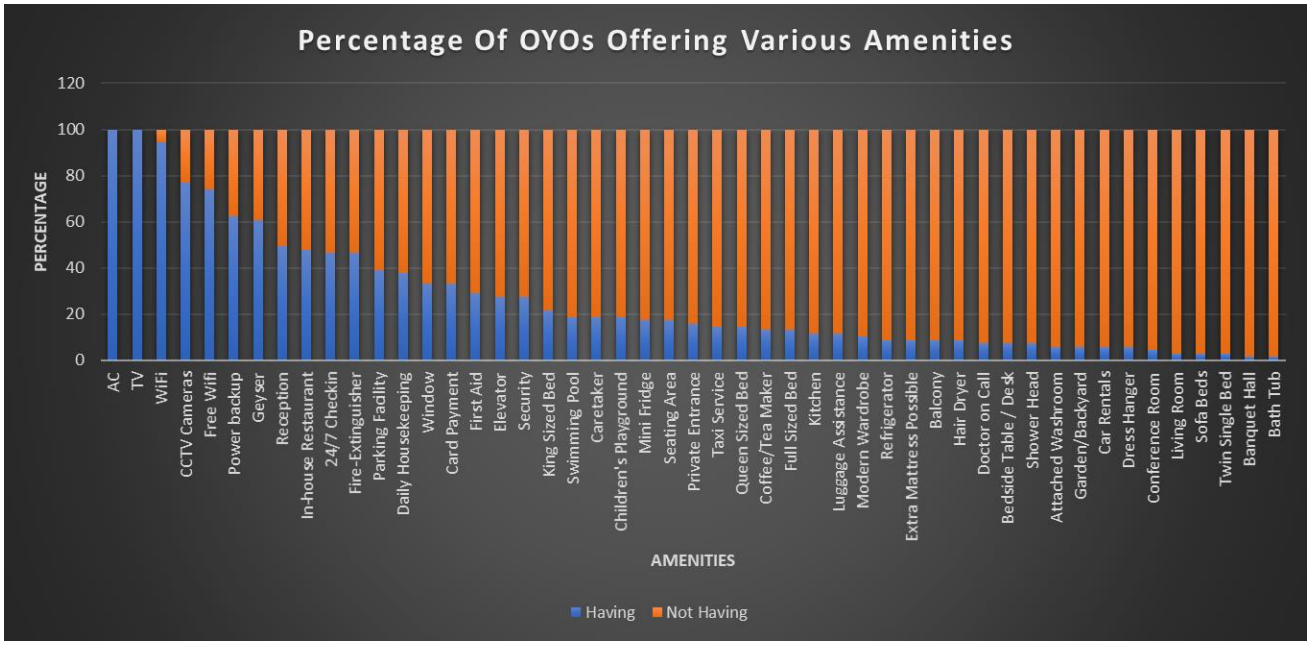


Percentage Of Various OYO Categories In Goa



Top Categories: HOME, HOTEL, FLAGSHIP

Distribution Of Amenities Offered By Various OYOs



Almost all OYOs offer AC,TV and Wi-Fi
More than half offer CCTV cameras, Free Wi-Fi, Power backup, Geyser
Very few OYOs offer Bath Tubs, Banquet Halls, Living Rooms, Conference Rooms

Insights

Rank	Top Locations To Obtain A Higher Rating
1	CALANGUTE
2	SALIGAO
3	CANDOLIM

Rank	OYO Types To Obtain The Highest Rating
1	Collection O
2	Flagship
3	Townhouse

Rank	Top Amenities To Obtain A Higher Rating
1	Daily Housekeeping
2	Caretaker
3	Fire-Extinguisher
4	Luggage Assistance
5	Swimming Pool

Rank	Top Locations To Obtain A Higher Price
1	CALANGUTE
2	SALIGAO

3	CANDOLIM

Rank	OYO Types To Obtain The Highest Price
1	Townhouse

Rank	Top Amenities To Obtain A Higher Price
1	Modern Wardrobe
2	Balcony
3	Geyser
4	Garden/Backyard
5	Private Entrance
6	Sofa Beds
7	Living Room
8	King Sized Bed
9	Luggage Assistance
10	24/7 Checkin

Using the above insights, we can make a good combination of basic amenities to obtain a rating & price which is higher than the average

LOCATION	Calangute
CATEGORY	Collection O
AMENITIES	Daily Housekeeping
	Caretaker
	Fire-Extinguisher
	Luggage Assistance
	Swimming Pool
	24/7 Checkin
	Sofa Beds
	Living Room
	King Sized Bed
	Private Entrance
	Garden/Backyard
	Balcony

We can obtain a rating of 4.3 and a price of Rs 6157/Night, which is higher than the average rating of an OYO which is just 4.16 & higher than the average price which is just 5537/Night.

Results from SVM
Prediction of rating of new & unrated OYOs

OYO Name	Predicted Rating
POP 85139 Kabir Guest House	4.5
Townhouse OAK 7 Spices	4.5
OYO 83865 Baba Guest House	4.3

OYO 85326 Corinthia Boutique Rooms	4.3
OYO 85229 Trivikram Krupa Guest House	4.2
OYO 85106 Hotel Elvin,s Place	4.2
OYO 84752 Hotel Joy Guest House	4.2
OYO 84895 Hotel Maples Calangute Pristne	4.2
OYO 83955 Hotel Log Inn	3.5
OYO 84393 David Holiday Home	2.9