PROJECT

- Title - Hotel Booking Prediction System
- Tool Used – Python

  Libraries :
  - Numpy
  - Pandas
  - Matplotlib
  - Seaborn

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
df=pd.read_csv("Project 1/Data/hotel_bookings.csv")
print(df.tail())
print(df.shape)
```

```
            hotel  is_canceled  ...  reservation_status  reservation_status_date
119385  City Hotel            0  ...           Check-Out                9/6/2017
119386  City Hotel            0  ...           Check-Out                9/7/2017
119387  City Hotel            0  ...           Check-Out                9/7/2017
119388  City Hotel            0  ...           Check-Out                9/7/2017
119389  City Hotel            0  ...           Check-Out                9/7/2017

[5 rows x 32 columns]
(119390, 32)
```

PROJECT (…..continued)

- Data Cleaning
  - Clean NA values
  - Fill NA values

country	market_se	distributio	is_repeate	previous_c	previous_b	reserved_r	assigned_r	booking_c	deposit_ty	agent	company	days_in_w	customer_	adr
PRT	Direct	Direct	0	0	0	C	C	3	No Deposi	NULL	NULL	0	Transient	0
PRT	Direct	Direct	0	0	0	C	C	4	No Deposi	NULL	NULL	0	Transient	0
GBR	Direct	Direct	0	0	0	A	C	0	No Deposi	NULL	NULL	0	Transient	75
GBR	Corporate	Corporate	0	0	0	A	A	0	No Deposi	304	NULL	0	Transient	75
GBR	Online TA	TA/TO	0	0	0	A	A	0	No Deposi	240	NULL	0	Transient	98
GBR	Online TA	TA/TO	0	0	0	A	A	0	No Deposi	240	NULL	0	Transient	98
PRT	Direct	Direct	0	0	0	C	C	0	No Deposi	NULL	NULL	0	Transient	107
PRT	Direct	Direct	0	0	0	C	C	0	No Deposi	303	NULL	0	Transient	103
PRT	Online TA	TA/TO	0	0	0	A	A	0	No Deposi	240	NULL	0	Transient	82
PRT	Offline TA	TA/TO	0	0	0	D	D	0	No Deposi	15	NULL	0	Transient	105.5
PRT	Online TA	TA/TO	0	0	0	E	E	0	No Deposi	240	NULL	0	Transient	123
PRT	Online TA	TA/TO	0	0	0	D	D	0	No Deposi	240	NULL	0	Transient	145

```
print(df.shape)
print(df.isna().sum())
def data_clean(df):
    df.fillna(0,inplace=True)
    print(df.isnull().sum())
print(data_clean(df))
```

```
meal                            0
country                       488
market_segment                  0
distribution_channel            0
is_repeated_guest               0
previous_cancellations          0
previous_bookings_not_canceled  0
reserved_room_type              0
assigned_room_type              0
booking_changes                 0
deposit_type                    0
agent                       16340
company                    112593
days in waiting list            0
```

```
meal                            0
country                         0
market_segment                  0
distribution_channel            0
is_repeated_guest               0
previous_cancellations          0
previous_bookings_not_canceled  0
reserved_room_type              0
assigned_room_type              0
booking_changes                 0
deposit_type                    0
agent                           0
company                         0
days in waiting list            0
```

PROJECT (…..continued)

- Check for incorrect data/ outlier
- Filter the data

2566	Resort Hot	0	0	2015	October	43	22	2	5	2	0	0	BB	GBR	Offline TA/	TA/TO
2567	Resort Hot	1	3	2015	October	43	22	2	5	2	0	0	BB	PRT	Direct	Direct
2568	Resort Hot	0	133	2015	October	43	22	2	5	0	0	0	BB	GBR	Offline TA/	TA/TO
2569	Resort Hot	1	122	2015	October	43	22	1	3	1	0	0	BB	PRT	Online TA	TA/TO
2570	Resort Hot	0	122	2015	October	43	22	1	3	2	0	0	BB	ESP	Online TA	TA/TO

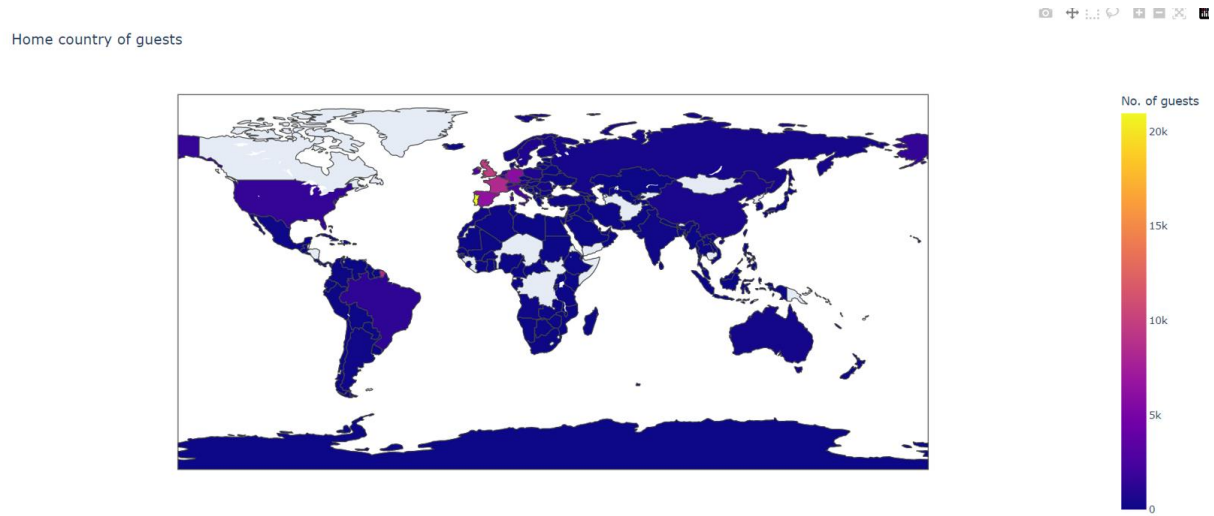
```
list_cols=["children","adults","babies"]
for i in list_cols:
    print(f"{i} has unique values as {df[i].unique()}")
filtered_data=(df['children']==0)&(df['adults']==0)&(df['babies']==0)
final_data=df[~filtered_data]
print(final_data.shape)
```

```
children has unique values as [ 0.  1.  2. 10.  3.]
adults has unique values as [ 2  1  3  4 40 26 50 27 55  0 20  6  5 10]
babies has unique values as [ 0  1  2 10  9]
(119210, 32)
```

DATA ANALYSIS

1. Which country does guests come from ?

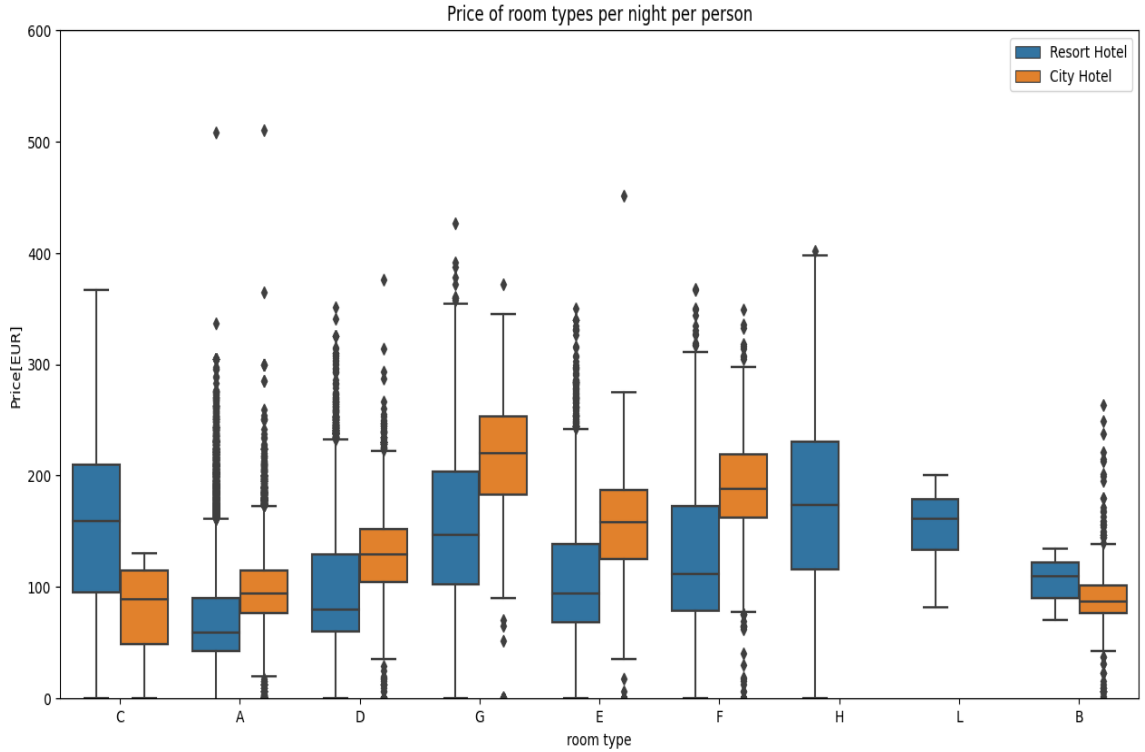
```
country_wise_data=final_data[final_data['is_canceled']==0]['country'].value_counts().reset_index()
country_wise_data.columns=["Country","No. of guests"]
print(country_wise_data)
import plotly.express as px
map_guests=px.choropleth(country_wise_data, locations=country_wise_data['Country'],
                         color=country_wise_data["No. of guests"],
                         hover_name = country_wise_data['Country'],
                         title="Home country of guests"
                         )
print(map_guests.show())
```



PROJECT (…..continued)

2. How much does the guests pay a room per day ?

```
final_data["hotel"].unique()
data_resort=final_data[(final_data["hotel"]=="resoer hotel") & (final_data["is_canceled"]==0)]
data_city=final_data[(final_data["hotel"]=="City hotel")& (final_data["is_canceled"]==0)]
print(df["adr"])
data=final_data[final_data["is_canceled"]==0]
plt.figure(figsize=(12,8))
print(sns.boxplot(x="reserved_room_type", y="adr",hue="hotel",data=data))
plt.title("Price of room types per night per person")
plt.xlabel("room type")
plt.ylabel("Price[EUR]")
plt.legend(loc="upper right")
plt.ylim(0,600)
```



PROJECT (…..continued)

3. How does the price vary over a year ?

```
resort_hotel=data_resort.groupby(['arrival_date_month'])['adr'].mean().reset_index()
city_hotel=data_city.groupby(['arrival_date_month'])['adr'].mean().reset_index()
final=resort_hotel.merge(city_hotel, on="arrival_date_month")
print(final)
```

	arrival_date_month	adr_x	adr_y
0	April	75.867816	111.962267
1	August	181.205892	118.674598
2	December	68.410104	88.401855
3	February	54.147478	86.520062
4	January	48.761125	82.330983
5	July	150.122528	115.818019
6	June	107.974850	117.874360
7	March	57.056838	90.658533
8	May	48.706289	120.669827
9	November	61.775449	86.946592
10	October	96.416869	102.776582
11	September	96.436869	112.776583

RESULTS AND DISCUSSION

The hotel booking prediction system was built using Python for dataset containing 119,390 observations and 32 variables, including features such as booking dates, lead times, number of guests, and hotel location, model achieved high accuracy and precision, indicating that it was able to accurately classify the bookings and minimize false positives (incorrectly classifying non-bookings as bookings). The high recall also indicates that the model was able to minimize false negatives (incorrectly classifying bookings as non-bookings). However, the model could still be improved by incorporating additional features such as customer behavior, hotel amenities, and pricing strategies. Additionally, the dataset used for the project only covered a limited time period and geographical location, which may not be representative of all hotel booking patterns globally. Overall, the hotel booking prediction system developed in this project can be a valuable tool for the hospitality industry to optimize their revenue management strategies and improve their customer experience.

CONCLUSION

I have gained hands-on experience in using data science techniques to build a predictive model for hotel booking. I have developed skills in data cleaning, feature engineering, model selection, and evaluation. I have also learned how to use programming languages such as Python and data science tools such as Jupyter Notebook, Pandas.

REFERENCE

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THANKYOU