Capstone Project -1

EDA On Hotel Booking Analysis

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Problem Statement

- For this project we will be analyzing Hotel Booking data. This data set contains booking information for city hotels and resort hotels, and includes information such as when the booking was made, length of stay, the number of adults, children, and/or babies,the number of available parking spaces etc.

- The main objective behind this project is to explore and analyze data to discover important factors that govern the bookings and give insights to hotel management, who can perform various campaigns to boost the business and performance.

- Hotel industry is a very volatile industry and the bookings depends on above factors and many more.

Workflow

So we will divide our work flow into following 3 steps.

EDA will be divided into following 3 analysis.

1) **Univariate analysis:** Univariate analysis is the simplest of the three analyses where the data you are analyzing is only one variable.
2) **Bivariate analysis:** Bivariate analysis is where you are comparing two variables to study their relationships.
3) **Multivariate analysis:** Multivariate analysis is similar to Bivariate analysis but you are comparing more than two variables.

Data Collection and Understanding

After collecting data it's very important to understand your data. So we had hotel Booking analysis data. Which had 119390 rows and 32 columns. So let's understand these 32 columns.

Data Description:

hotel : Resort Hotel or City Hotel
is_canceled : Value indicating if the booking was canceled (1) or not (0)
lead_time : Number of days that elapsed between the entering date of the booking and the arrival date
arrival_date_year : Year of arrival date
arrival_date_month : Month of arrival date
arrival_date_week_number : Week number of year for arrival
date **arrival_date_day_of_month** : Day of arrival date
stays_in_weekend_nights : Number of weekend nights
stays_in_week_nights : Number of week nights.
adults : Number of adults
children : Number of children
babies : Number of babies
meal : Type of meal booked.
country : Country of origin.

Data Collection and Understanding

market_segment : Market segment designation. (TA/TO)
distribution_channel : Booking distribution channel.(TA/TO)
is_repeated_guest : is a repeated guest (1) or not (0)
previous_cancellations : Number of previous bookings that were cancelled by the customer prior to the current booking
previous_bookings_not_canceled : Number of previous bookings not cancelled by the customer prior to the current booking
reserved_room_type : Code of room type reserved.
assigned_room_type : Code for the type of room assigned to the booking.
booking_changes : Number of changes made to the booking from the moment the booking was entered on the PMS until the moment of check-in or cancellation
deposit_type : No Deposit, Non Refund , Refundable.
agent : ID of the travel agency that made the booking
company : ID of the company/entity that made the booking
days_in_waiting_list : Number of days the booking was in the waiting list before it was confirmed to the customer
customer_type : type of customer. Contract,Group,transient,Transient party.
adr : Average Daily Rate as defined by dividing the sum of all lodging transactions by the total number of staying nights
required_car_parking_spaces : Number of car parking spaces required by the customer
total_of_special_requests : Number of special requests made by the customer (e.g. twin bed or high floor)
reservation_status : Reservation last status.

Data Cleaning and Manipulation

- There were 4 columns company, agent, country and children with missing values.

```
[ ] df1.isna().sum().sort_values(ascending=False)

company                 82137
agent                   12193
country                   452
children                    4
reserved_room_type          0
assigned_room_type          0
```

```
[ ] ##Filling the null values
    null_values =  ['company', 'agent','children']
    for i in null_values:
      df1[i].fillna(0, inplace = True)

    df1['country'].fillna('others', inplace = True)
```

- Handling Duplicates: Data had 31994 duplicates values. So we dropped it from the data.

```
#looking at duplicates
df1.duplicated().value_counts()

False    87396
True     31994
dtype: int64

[ ] #dropping the duplicate values
    df1 = df1.drop_duplicates()
```

- Feature Engineering:

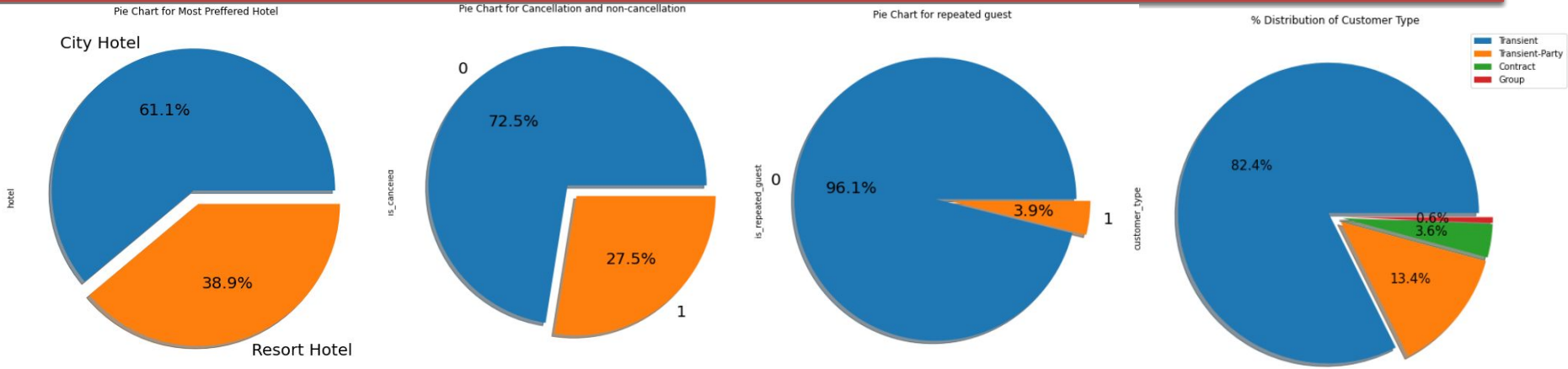
We created 2 new columns

1)'Total_Guests = from the Children, adults, babies.

2) 'total_stay_duration' = From weekend nights and weekdays night

```
df1["Total_Guests"] = df['adults']+df['children']+df['babies']
df1['total_stay_duration'] = df1['stays_in_weekend_nights'] + df1['stays_in_week_nights']
```

Exploratory Data Analysis (EDA)

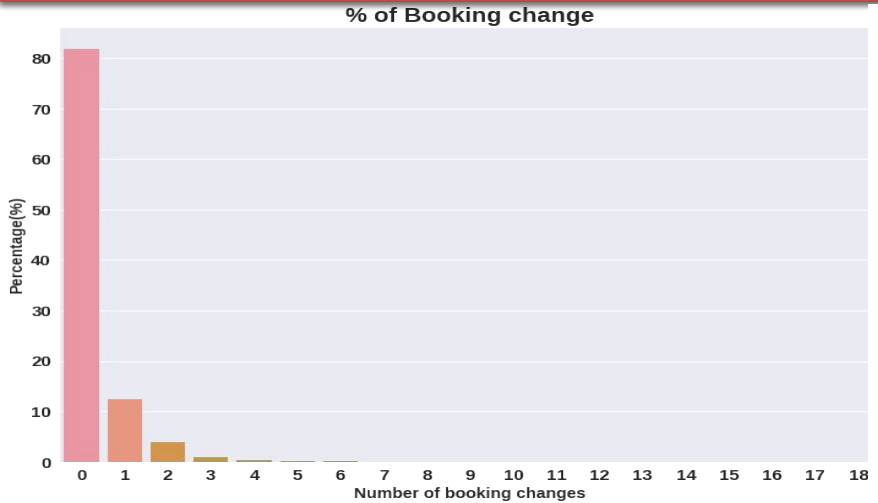


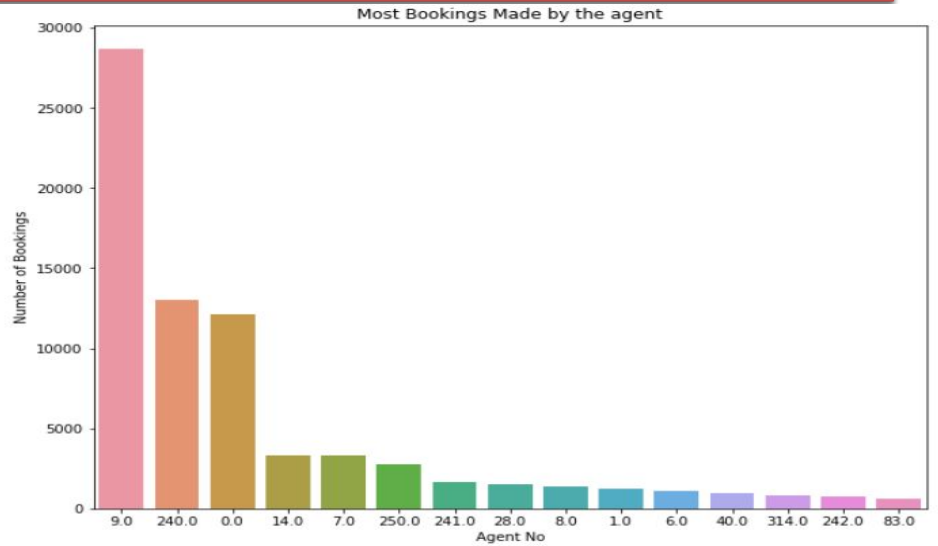
Observations

- City hotel is the most preferred hotel type by the guests. We can say City hotels are much busier. Also 27.5 % of bookings were cancelled out of all the bookings
- Only 3.9 % of people revisited the hotels. Rest 96.1 % were new guests. Thus retention rate is low.
- Most of the customers/guests were Transient type(82.4%). And transient party were 13.4% and 0.6 belongs to group. Remaining guests belongs to Contract type.

Contract-when the booking has an allotment or other type of contract associated to it
Group -when the booking is associated to a group
Transient-when the booking is not part of a group or contract, and is not associated to other transient booking
Transient-party-when the booking is transient, but is associated to at least other transient booking

Exploratory Data Analysis (EDA)



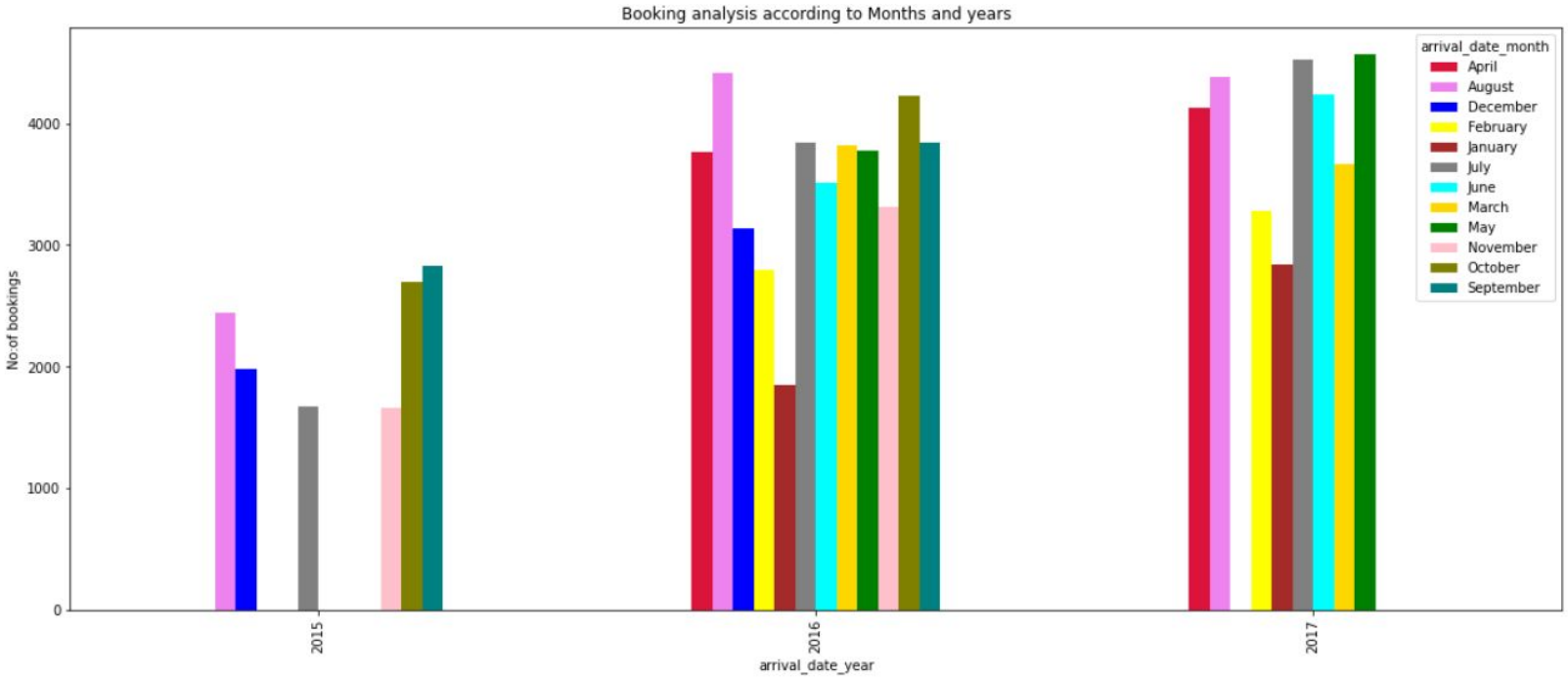


Observations

- The percentage of 0/No changes changes made in the booking was more than 82 %. Percentage of Single changes made was just above 10%.

- Agent Id no: 9 made the highest bookings which is more than 28721.

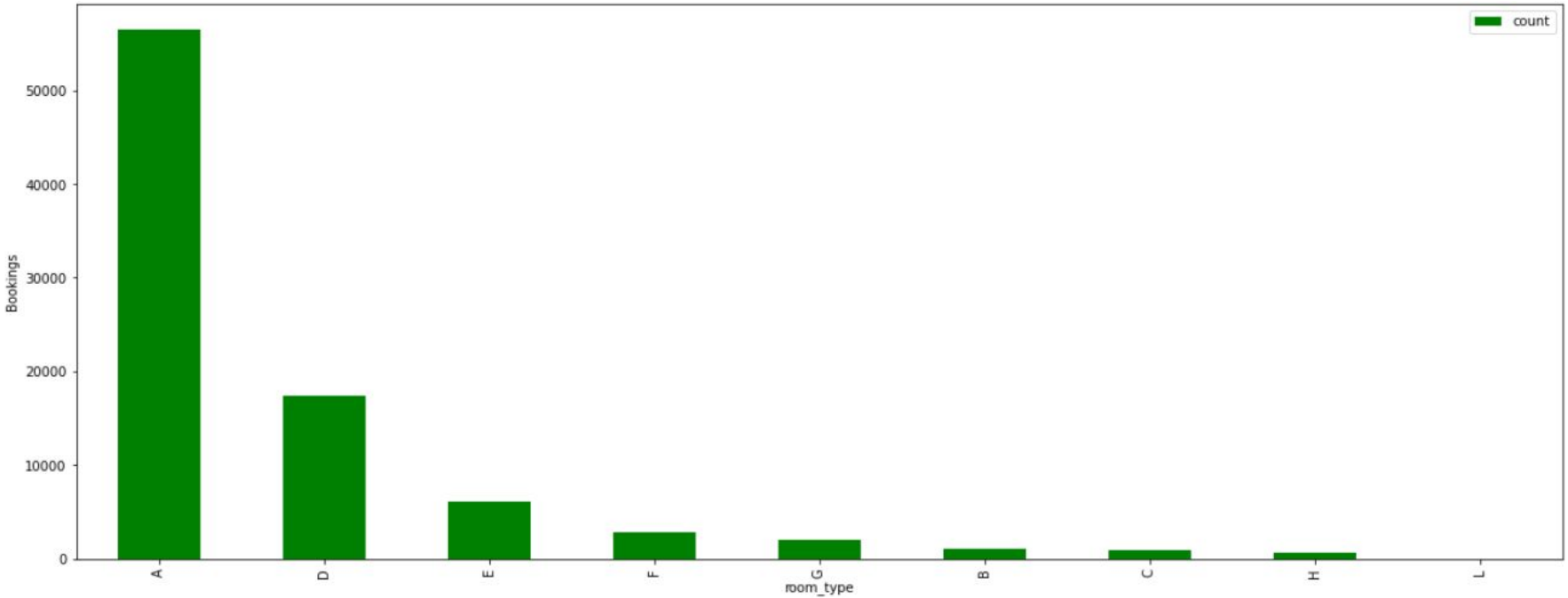
Exploratory Data Analysis (EDA)



Observations

- August and July are the only two months in the given three years where there have always been bookings.
- 2016 saw the largest number of hotel bookings among the given three years.

Exploratory Data Analysis (EDA)



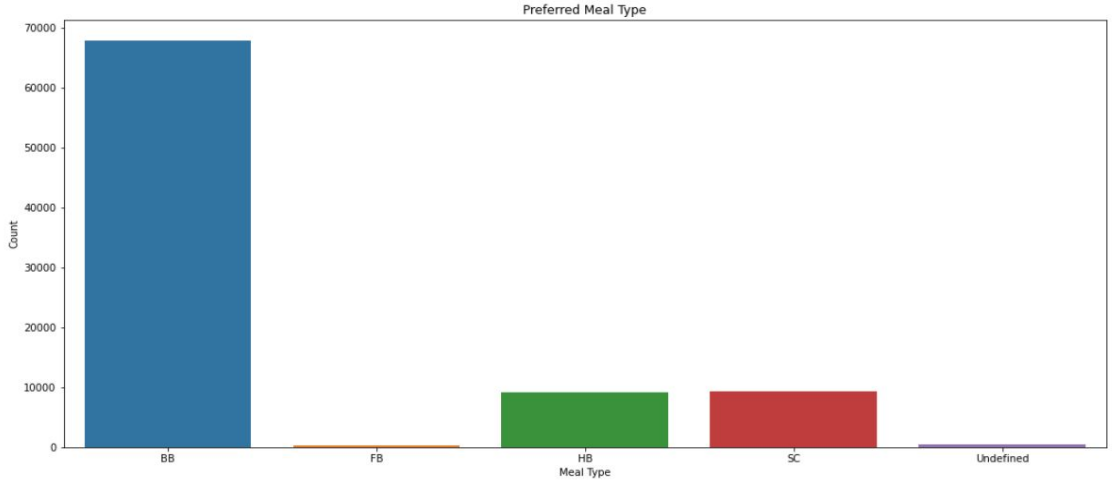
Observation

Room type ‘A’ is most preferred by the guests second most preferred is ‘D’.

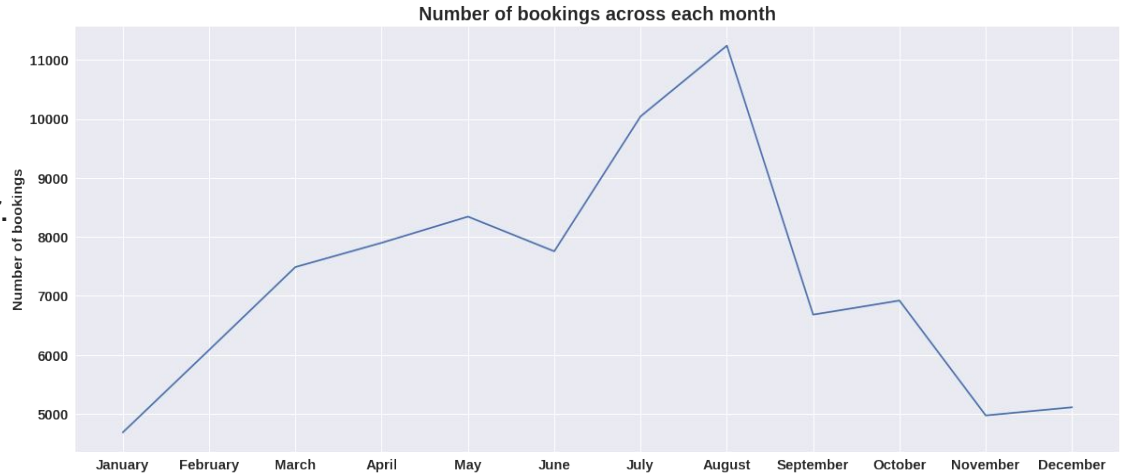
Exploratory Data Analysis (EDA)

Observations

- BB(Bed & Breakfast) is the most preferred type of meal by the guests.
- Full Board i.e. FB is the least preferred.
- HB (Half Board) and SC(Self Catering) are equally preferred.



- As we can see from the line chart, there was a clear spike in the number of bookings between June and September.
- July and August had the most bookings probably because of more holidays/vacations.



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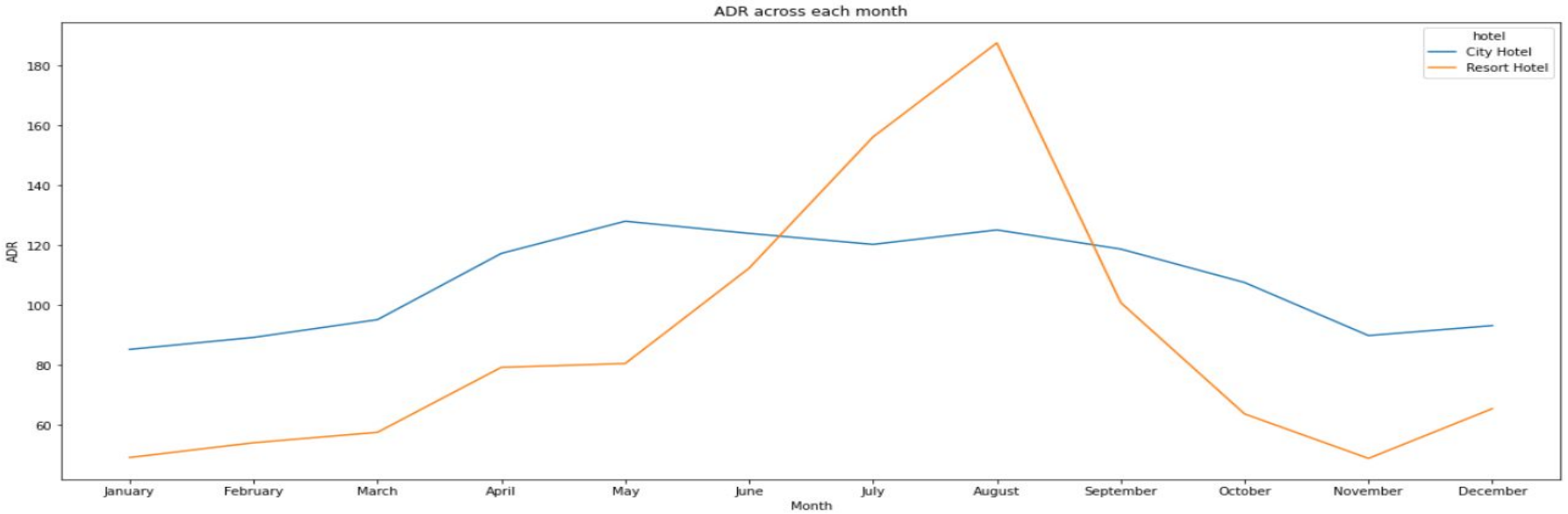
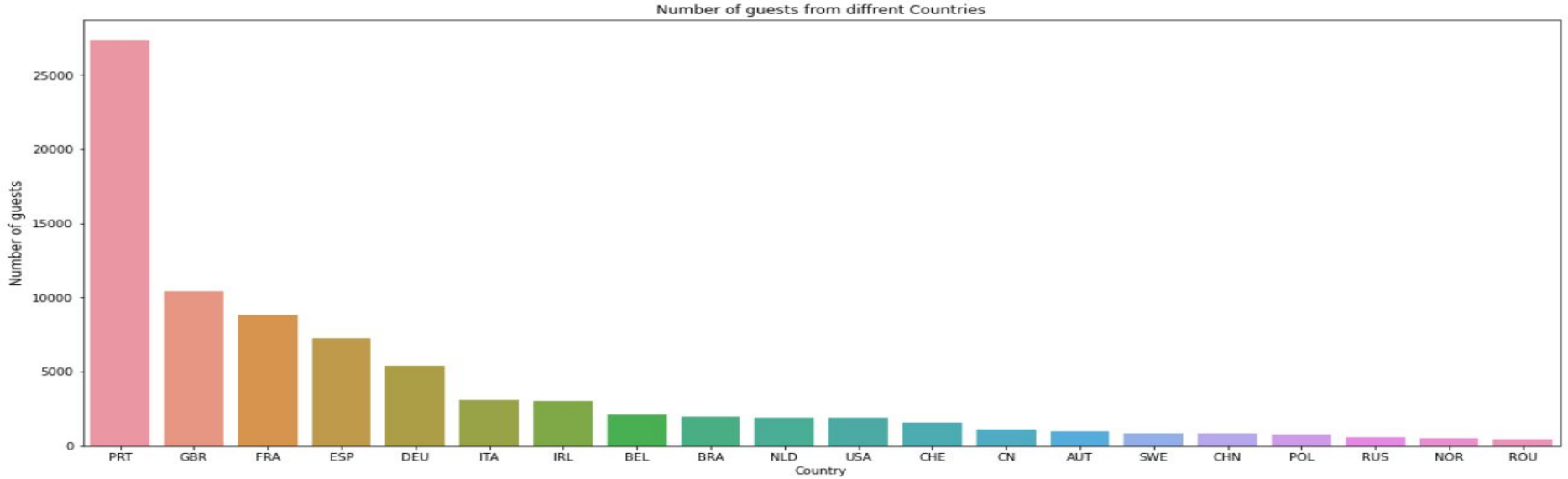


Observations

- Resort hotels had the highest adr between June and August than City hotels. But in other months adr of Resort hotels were less than the City hotels.

- Thus we can say that, January, February, March, April ,November and December are the good months for customers to get good deals.

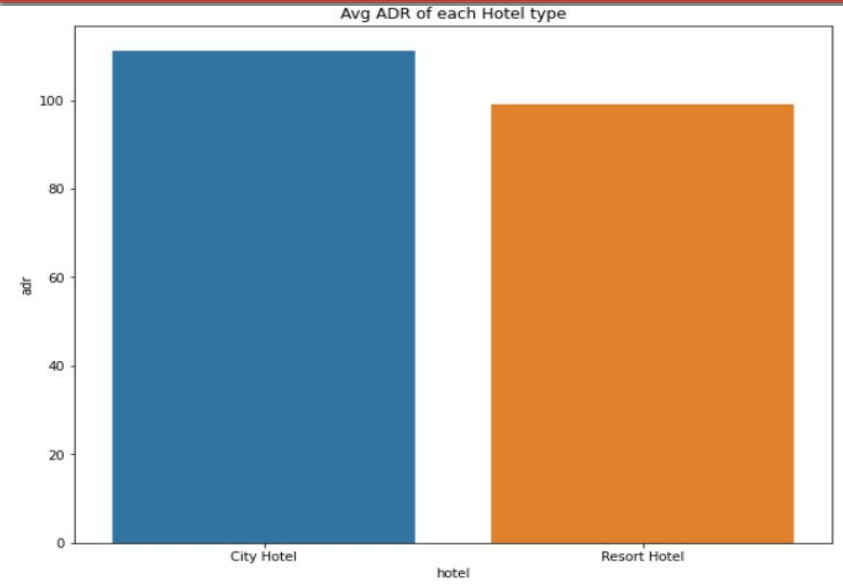
Exploratory Data Analysis (EDA)

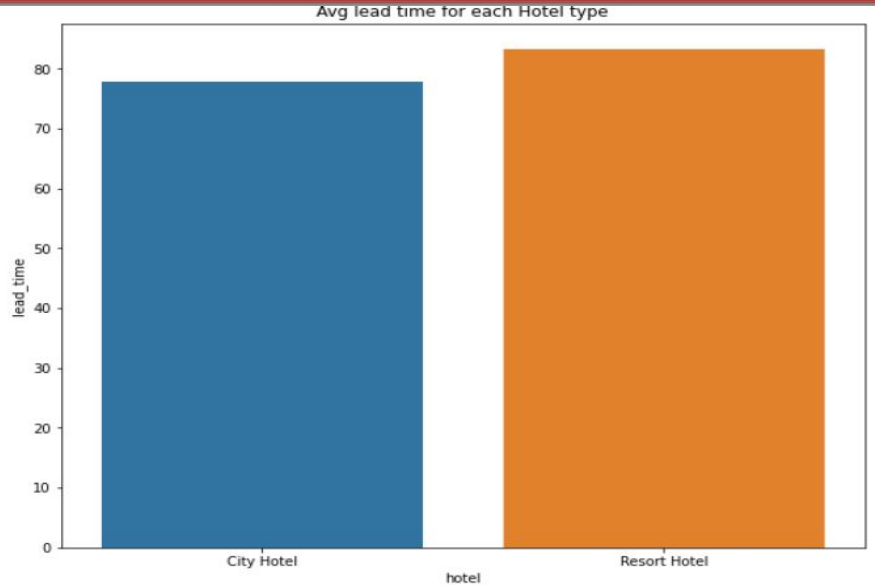


Observations

- Maximum number of bookings were from Portugal.i.e. more than 25000.
- After Portugal, GBR(Great Britain),France and Spain are the countries from where most of the bookings came.

Exploratory Data Analysis (EDA)



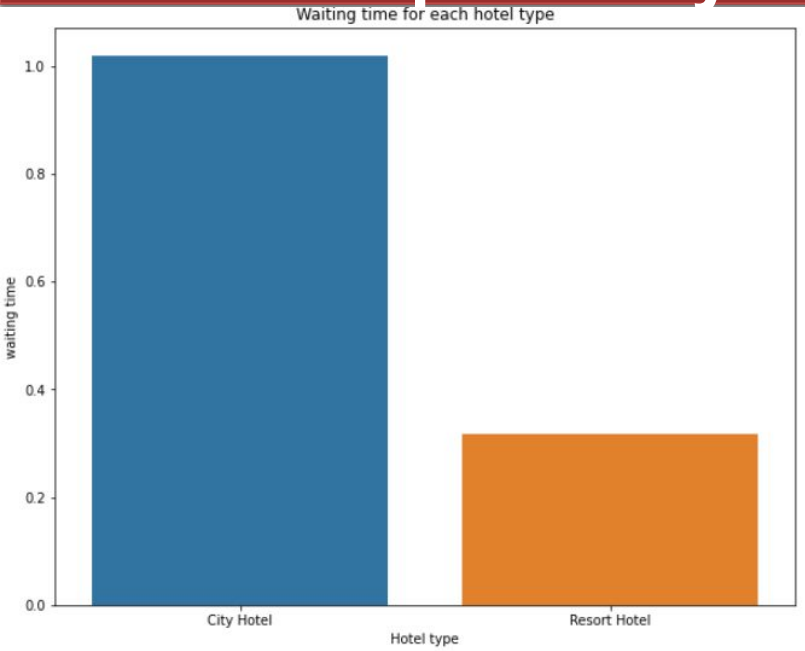


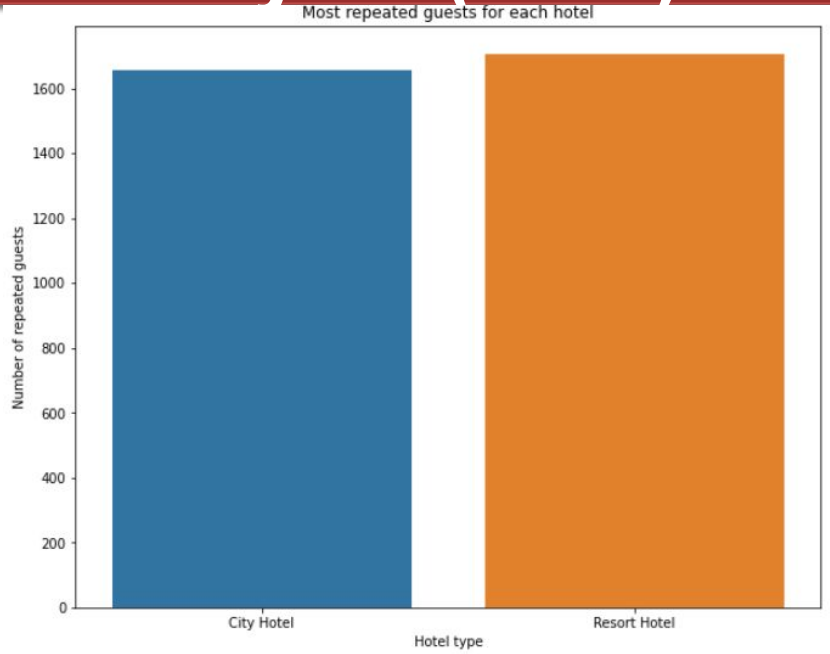
Observations

- Average ADR for city hotel is high as compared to resort hotels. These City hotels are generating more revenue than the resort hotels.

- Average lead time for resort hotel is high. It means people plan their trip too early. Usually people prefer resort hotels for longer stays. That's why people plan early

Exploratory Data Analysis (EDA)





Observations

- Waiting time period for a City hotel is high when compared with resort hotel.That means city hotels are much busier than Resort hotels.
- Resort hotels have the most no:of repeated guests. In order to increase the count of repeated guests hotel managements need to take valuable feedbacks from the guests and try to give good service. This can also include steps like making sure customers are allotted the type of room they originally opted for, offering good deals etc.

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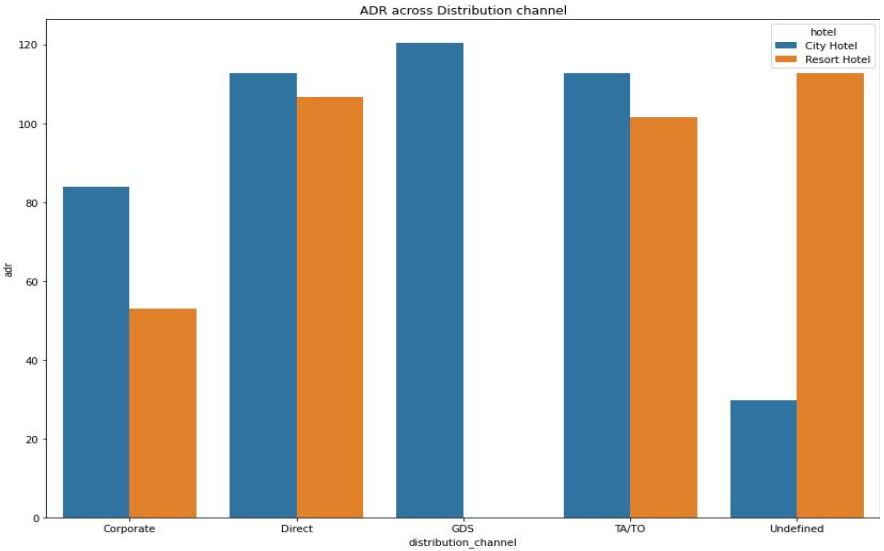
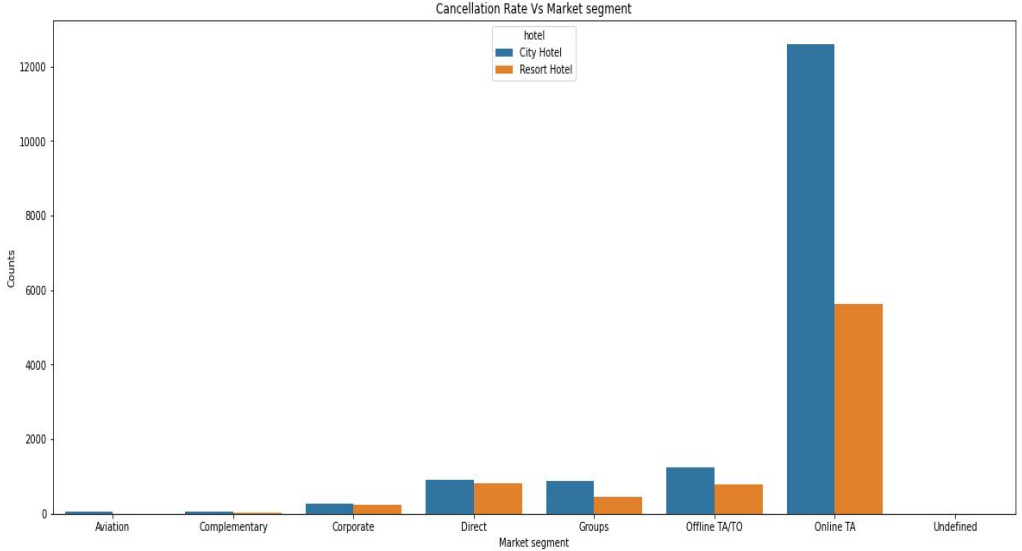




Observations

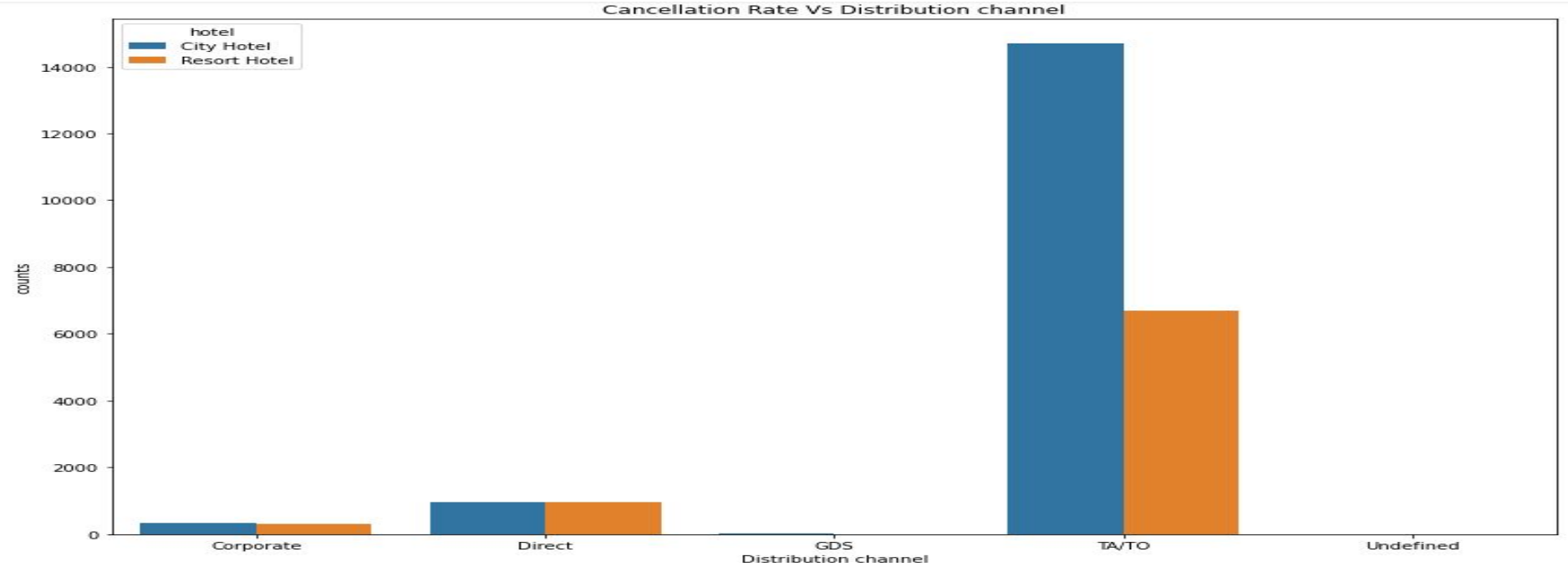
Distribution channel:

- 'Direct' and 'TA/TO' has almost equal adr in both types of hotel which is high among other channels.
- GDS has high adr in 'City Hotel' type. GDS needs to increase Resort Hotel bookings. From this we can say that “Direct” and ‘TA/TO’ are generating more revenue than the other channels.

Market Segment:

- Online T/A' has the highest cancellation for both type of hotels
- In order to reduce booking cancellations, hotels need to set the non-refundable and deposit policies.

Exploratory Data Analysis (EDA)

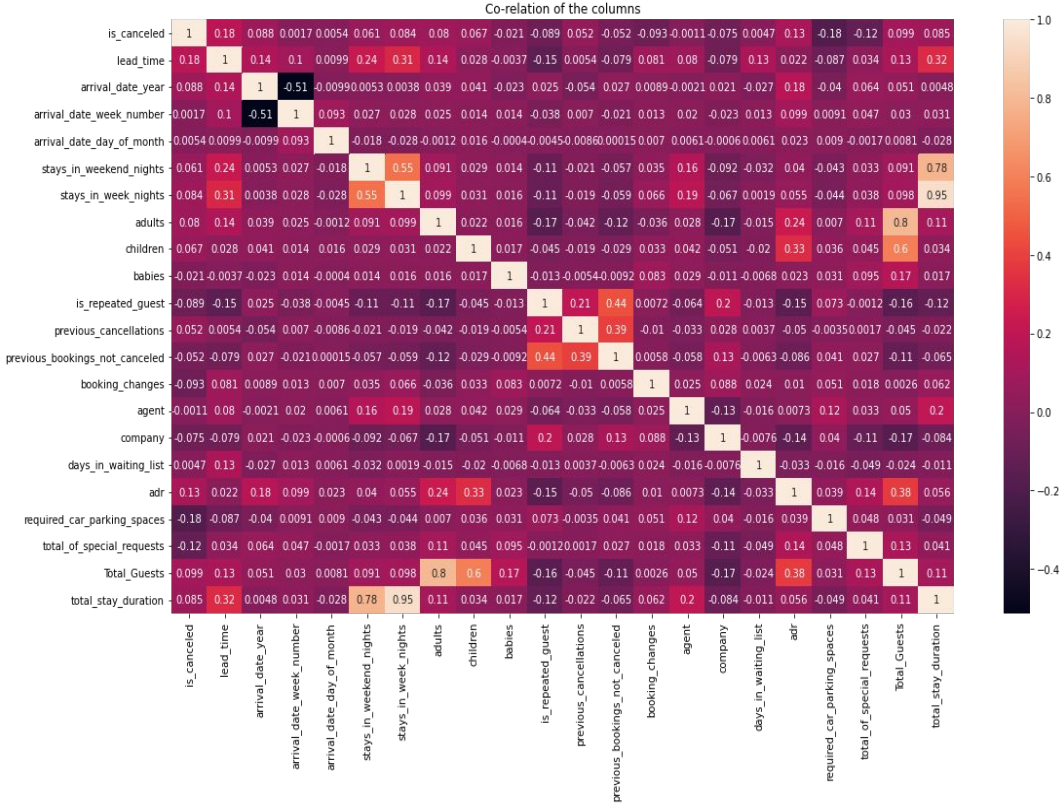


Observations

Distribution channel:

- 'TA/TO' distribution channel has highest cancellations for city hotels and more than 6000 cancellations for resort hotels. In order to reduce the cancellations they should improve their cancellation policies and deposit policies.

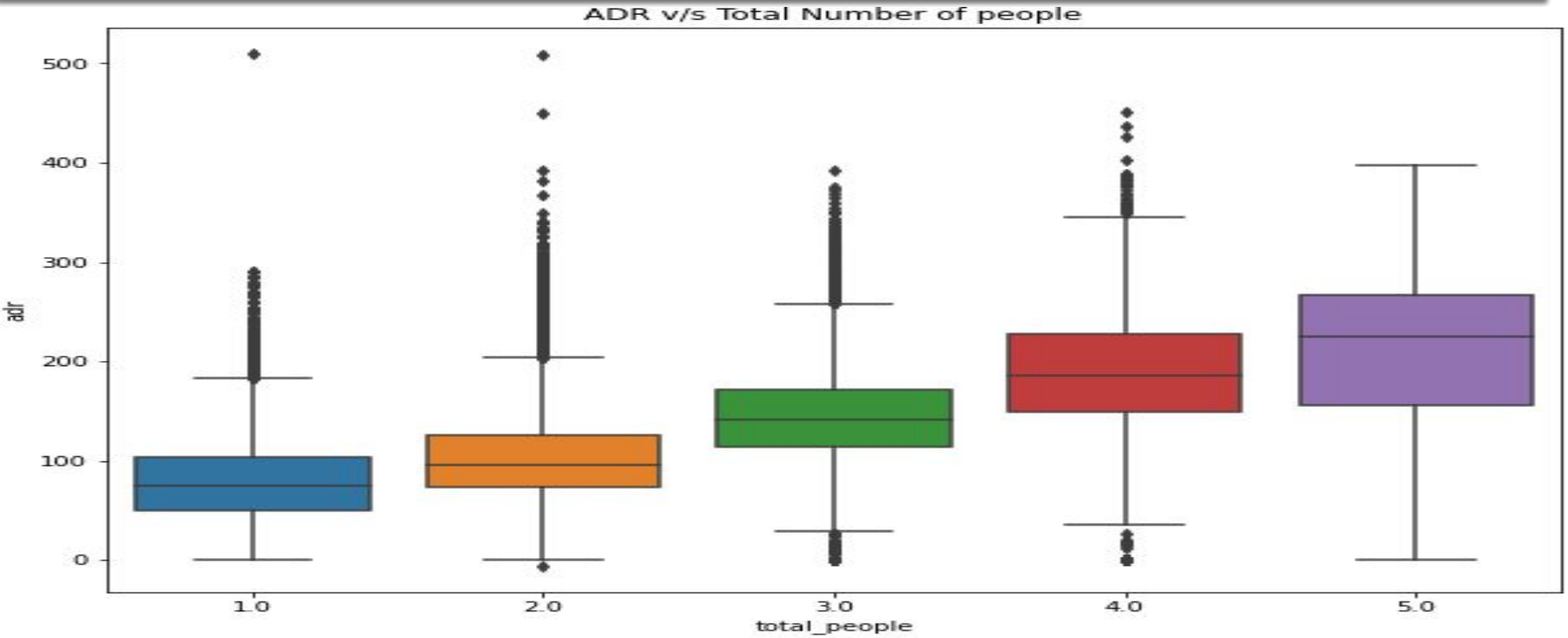
Exploratory Data Analysis (EDA)



Observations

- lead-time and total stay are positively correlated means more is the stay of customer more will be the lead time.
- ADR and total people are highly correlated. That means more the people more will be adr.High adr means high revenue
- is_repeated_guest and previous_bookings Not_canceled has strong correlation. May be repeated guests are not more likely to cancel their bookings.

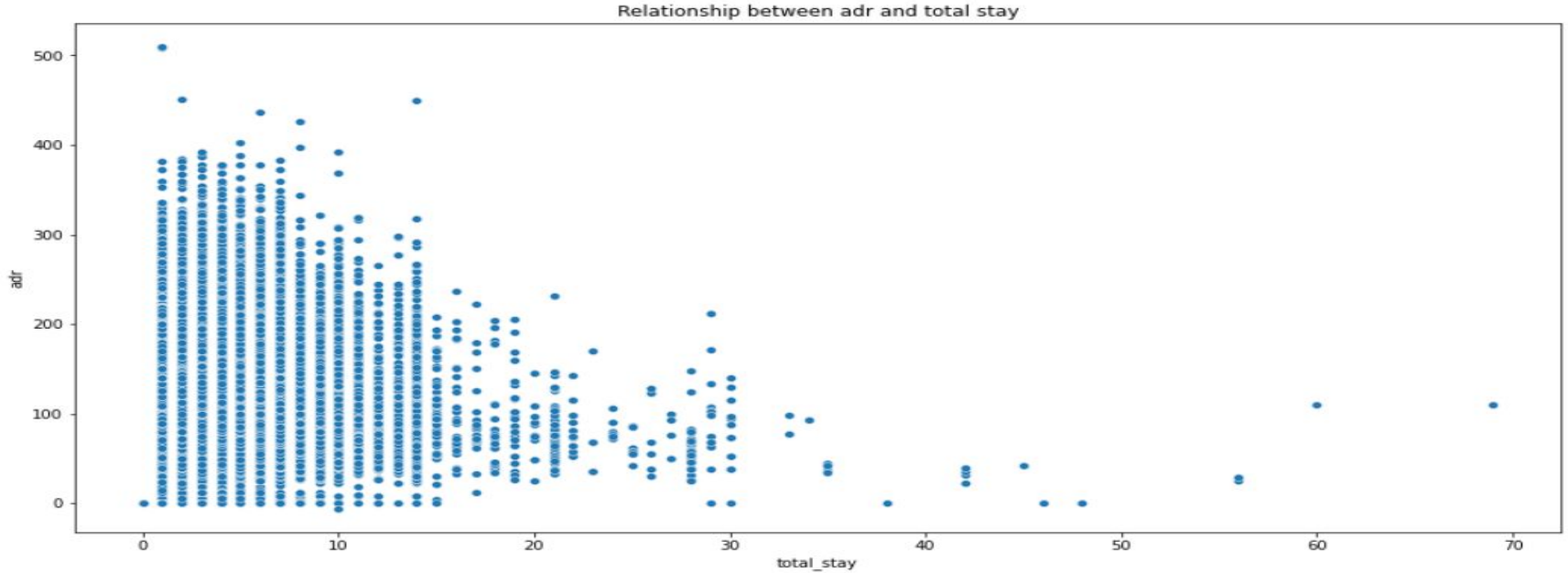
Exploratory Data Analysis (EDA)



Observations

- As we saw in Correlation heatmap, total people and adr are positively correlated. Thus for 2 people ,adr has an average value of almost 100 and for 5 people it's more than 200.
- Thus more the people more will be the revenue of hotels.

Exploratory Data Analysis (EDA)



Observation

- We can see that as length of stay or duration of stay increases the ADR decreases. This means for longer stay, customer has a chance of finalizing a better deal.

Conclusions

- City hotels are the most preferred hotel type by the guests. We can say City hotel is the busiest hotel.
- 27.5 % of bookings were cancelled out of all the bookings.
- Highest number of people visited from Portugal.
- Room type 'A' was most preferred at the time of booking.
- Average ADR for city hotel is high as compared to resort hotels across all distribution channels . These City hotels are generating more revenue than the resort hotels. But during the peak months between June and August , resort hotels generates more revenue.
- Booking cancellation rate is high for City hotels.
- July and August had the most Bookings because people were more available then owing to holidays.
- 'Online T/A' has the highest cancellation among the type of Hotels
- In order to reduce the booking cancellations, hotels need to set non refundable and stricter deposit policies.
- As the length of the stay increases, the ADR also decreases.So, customer has a chance of finalizing a better deal for longer stays.

THANK YOU