Hotel Booking Analysis

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AlmaBetter Capstone Project

Abstract:

Ever since the pandemic hit worldwide, almost all industry sectors have observed a negative business impact with 'Hotel' sector under 'Travel and Tourism' industry taking a major blow. With near end of the global pandemic the business is thriving more than ever but it's not the same as before. With advent of technology, people have become more aware of multiple mediums to book reservations at luxurious Hotels at affordable prices. This has made many entrepreneurs and business leaders realize how important it is to be strategic and leverage data analysis to penetrate the market more and gain more market shares. By applying Exploratory Data Analysis principles and feature engineering, this study aims to explore merits of analysis on Hotels dataset that governs bookings and can help in increasing customer base. The decision support and benefits reported in this study advocate significance of Data Analysis.

1. Problem Statement

The dataset contains booking information for two different hotels. One being City Hotel and another Resort Hotel along with information on various booking criteria such as booking season, time of booking, length of stay, number of adults, children and babies, parking spaces, pricing data, market segment and many more.

Primary objective is to explore and inspect the dataset; and discover important features using Exploratory Data Analysis that can govern bookings and help hotels penetrate deep into the market, thereby attracting more customers. Analyze booking and pricing trends to draw out insights to make intelligent business decisions.

Secondary objective is to help the customers in deciding the best period to visit places while availing low accommodation cost benefits.

The dataset contains following features:

- hotel
- is_canceled
- lead_time
- arrival_date_year
- arrival_date_month
- arrival_date_week_number

- arrival_date_day_of_month
- stays_in_weekend_nights
- stays_in_week_nights
- adults
- children
- babies
- meal
- country
- market_segment
- distribution_channel
- is_repeated_guest
- previous_cancellations
- previous_bookings_not_canceled
- reserved_room_type
- assigned_room_type
- booking_changes
- deposit_type
- agent
- company
- days_in_waiting_list
- customer_type
- adr
- required_car_parking_spaces
- total_of_special_requests
- reservation_status
- reservation_status_date

2. Introduction

Over the past couple of decades, travel and tourism industry has seen a massive surge in terms of profit. With more people having better lifestyles and resources to travel, Hotel businesses have been growing very rapidly and there is scope for more. Hotel business is a lucrative yet very volatile business segment. It's dependent on multiple criteria like type of hotel, business seasons, customer segments, multiple modes of booking, amenities, services and many more. Starting a new Hotel business requires thorough data analysis on Industry, Customers, Competitors and many more. Which is what we are going to do in this project. Thorough Exploratory Data Analysis on guests, hotel type, bookings trend, pricing trend, distribution channels, people stay, etc. to draw out insights and make intelligent business decisions.

3. Motivation

To try and answer following questions from data:

- What are the hotel preferences of guests?
- From which country do the majority of guests visit the hotel?
- What is the booking trend of hotels round the year?
- What is the best season to leverage the benefits of low cost accommodation?
- Which market segment prospers more compared to others?
- What is the effect of different booking channels on reservation status?
- Is there any correlation between Booking, Pricing, Stay length, Cancellation, Parking and Guest revisiting with each other?
- What is the most preferred stay length?

4. Steps involved:

I. Data exploration and inspection

After importing essential libraries and loading the dataset, we explored and inspected the initial raw data. Gained information on size of dataset, each column's Dtype and non-null count. Go through columns data description and unique values in categorical columns.

II. Data Cleaning

Data cleaning involves

- **Handling Null values**: Handled null values in column 'agent' by replacing those with new agent ID 0 assuming those bookings were reserved without any agent; replacing nulls in column 'children' with 0 assuming guests had no children in their group and finally replacing null in column 'country' with 'other' assuming guests belonged to country other than available list.

- **Dropping irrelevant columns and rows:** Dropped irrelevant column 'company' which had 94% null data and rows with 0 guest total.
- **Parsing date:** Parsed required date column in string format to datetime format
- **Adding new feature columns:** 3 new columns were added for new feature analysis namely 'total_stay' and 'total_people'.

Finally, we have cleaned and processed data to work on to gain insights for better business decisions.

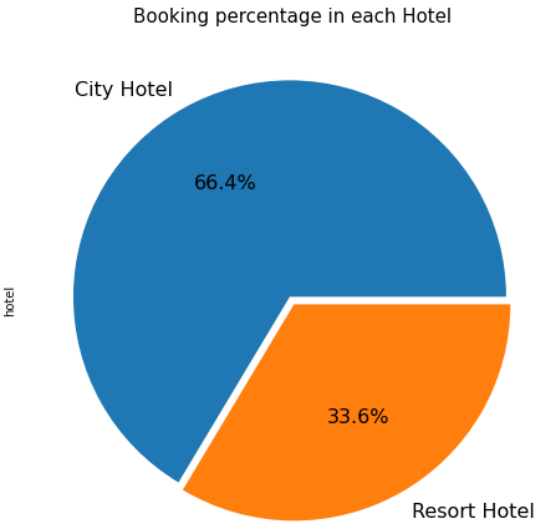
III. Exploratory Data Analysis and Data Visualization

To work on our problem statement, we start our initial analysis on one variable, then move onto relational analysis between two variables and gradually increase our analysis and include multiple variables and establish relation between them.

We will try to address each question we framed earlier one by one.

a. Booking percentage of different type of Hotels

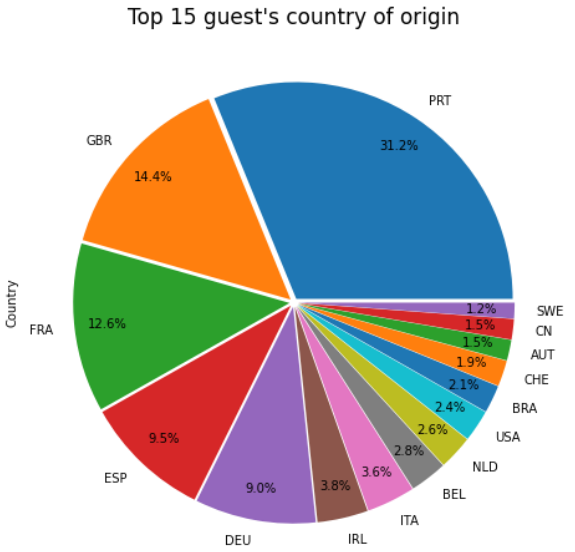
Approach: We fetched value count for types of resort



Inference: 2/3rd of total guest prefer City Hotel

b. Home country of majority of guests

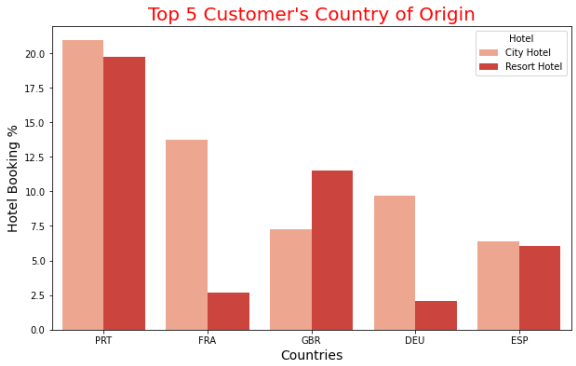
Approach: We featured a variable that groups 'country' by counts, sorts by values and fetches data for top 15 countries.



Inference: Most of the guests visiting these hotels are from Portugal and other European countries namely Britain, France, Spain and Germany.

c. Hotel preference of guest from Top 5 Countries

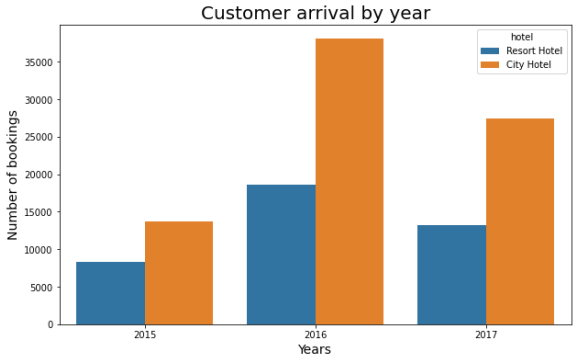
Approach: Sliced top 15 countries to just 5 countries and fetch hotel preferences of guest from these countries



Inference: Guests from southern European countries like Portugal and Spain prefer City Hotel and Resort Hotel equally. Guests from northern European countries like France and Germany prefer City Hotel a lot more than Resort Hotel**.** Guest from Britain prefers lavish Resort hotels

d. Overview of guest's visit over different years

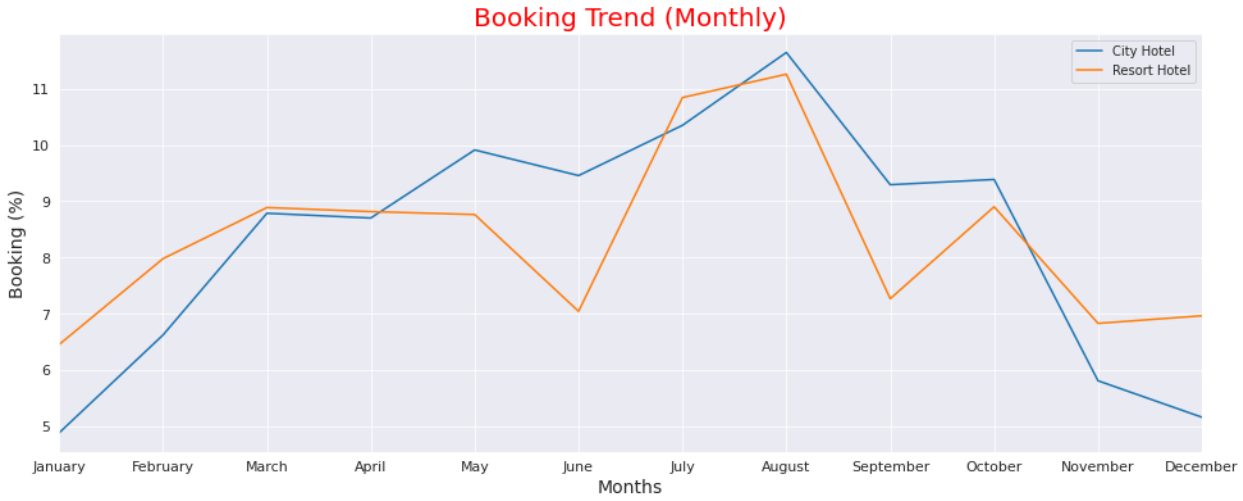
Inference: We fetched value count of booking reservation each year for different hotels

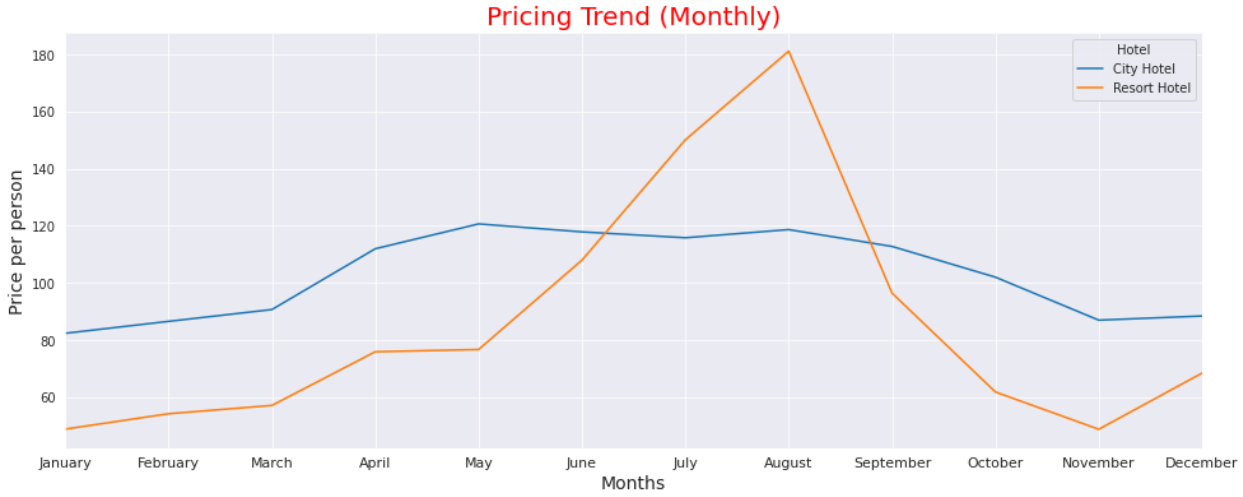


Inference: 2016 was the year where the number of hotel bookings was highest followed by total booking in 2017 and 2015.

e. Booking and Price trend round the year

Approach: We fetched booking count data and pricing per person data, grouped it by month with hue on city hotel and resort hotel and plotted a line graph to analyze booking trend and pricing trend respectively.



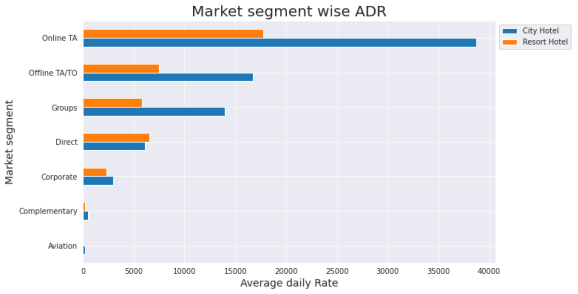


Inference: From the Booking trend it can be inferred that around 11.5% of total reservations throughout the year are coming from August whereas January has the least reservation of mere 5%.

Pricing trend is highly correlated with booking trend indicating that price for Resort hotels during peak season hikes to nearly 300% compared to off-season. Meanwhile, pricing trend for City hotels suggests almost same pricing throughout the year with low fluctuation during busy period from May to August

f. Average booking rate of different Market Segments

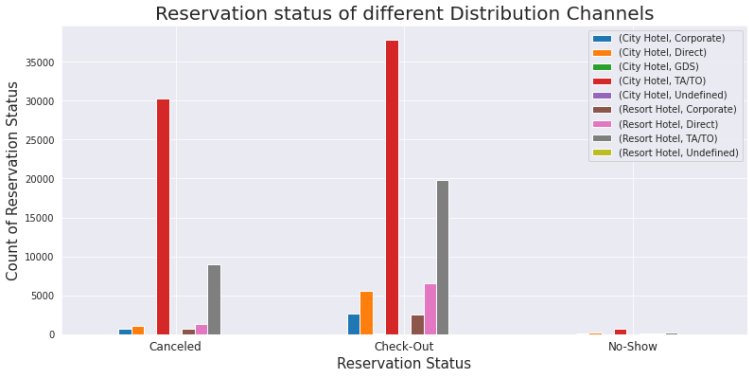
Approach: Grouping by different market segment and hotel; and plot average daily rate



Inference: Inspecting different market segments, it was concluded that online travel agency holds monopoly as both hotels are getting the most of booking from online travel agency (around 79%)

g. Reservation status from different Distribution Channels

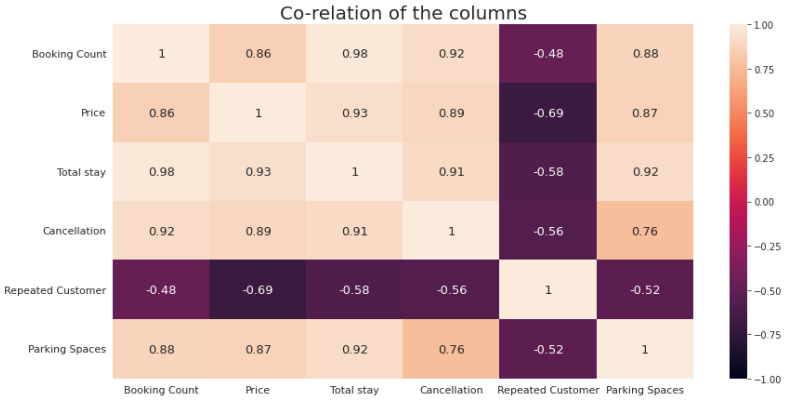
Approach: Grouping by different market segments and hotel; and analyzing different reservation status plot.



Inference: Bookings and Cancellations from both Hotels are more from Travel agency (TA/TO). Guest visiting both Hotels directly and via Corporate are less likely to cancel their booking

h. Correlation between different booking criteria

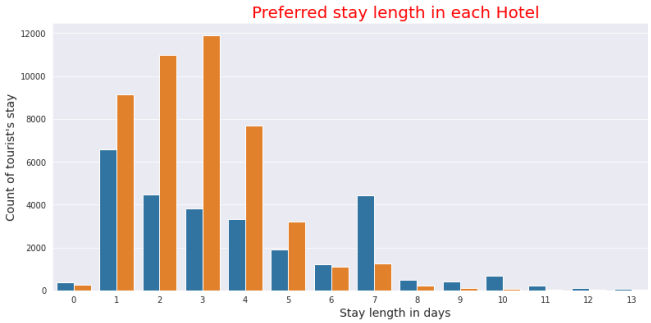
Approach: We carried out multiple aggregation on multiple booking relevant criteria to analyze correlation between them via Heatmap.



Inference: There is high positive correlation between Booking, Pricing, Total Stay, Cancellations and Parking spaces whereas negative correlation with Repeated guests. There is a firm correlation between Parking space and Cancellation inferring that people are more likely to cancel their booking if Parking space is not available.

i. Guest's stay length

Approach: Values count on our new feature column ‘total_stay’ to get insight on guest’s preferred stay length.



Inference: Ideally guests prefer to stay 1-4 days in both hotels but 7 days stay at Resort hotel is also a popular choice among guests.

5. Conclusion

- 75% of guests visiting are from European countries inferring that understanding and addressing needs of guests from these countries can help groom business more
- Interesting insight induced from this study was that Northern European countries prefer City hotels, western country Britain prefer Resorts more and southern countries prefer both equally.
- Booking trend indicates that Peak visiting season is from mid-June through August because of summer breaks in Europe while November through February is off season because of freezing cold weather throughout Europe.
- Pricing trend being highly correlated with booking trend indicated that price for Resort hotels during peak season hikes to nearly 300% compared to off-season.
- Guests can consider visiting these hotels during the shoulder season of June and September to enjoy benefits of both peak and off season with decent weather and almost full availability of hotel accommodation at very low cost.
- Online travel agencies hold a monopoly with 79% booking from this market segment. Hotel owners should consider promoting their hotels more in different market segments to penetrate the market more.
- With increase in Booking --> Pricing, Total stay and Parking spaces occupation increases but increase in Pricing also leads to repeated Customers not visiting again.
- Ideally guests prefer to stay 1-4 days in both hotels but 7 days vacation stay at Resort hotel is also a popular choice among guests.