



# Hotel Booking Analysis : Tackling Cancellation Rates

Insights and Suggestions for Optimal Booking  
Management

# Hotel Booking Dataset Overview

- The dataset contains information about bookings in two types of hotels. One of the hotels is a Resort Hotel and the other is a City Hotel.
- Both share the same structure, with 36 variables describing the 40,060 observations of Resort Hotel and 79,330 observations of City Hotel.



- Each observation represents a hotel booking.
- Bookings recorded from July 1, 2015 to August 31, 2017, include successful and canceled bookings.
- All data elements related to hotel and customer identification have been removed to ensure data privacy.

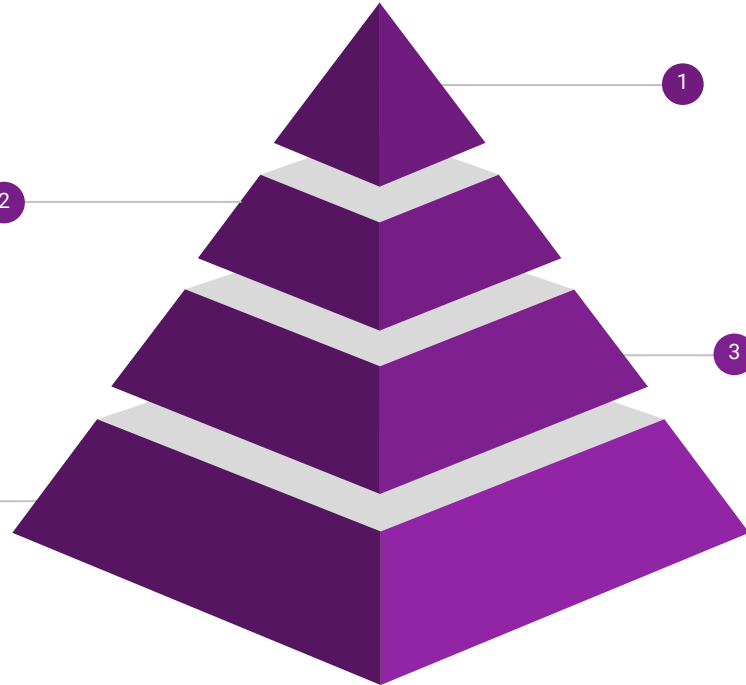
# Analysis of High Cancellation Rates in Hotel Bookings

## Objective

To understand factors causing high cancellations and devise strategies for revenue and booking optimization.

## Possible Solutions

Providing actionable solutions and strategies to minimize cancellations and improve bookings and revenue generation.



## Problem Statement

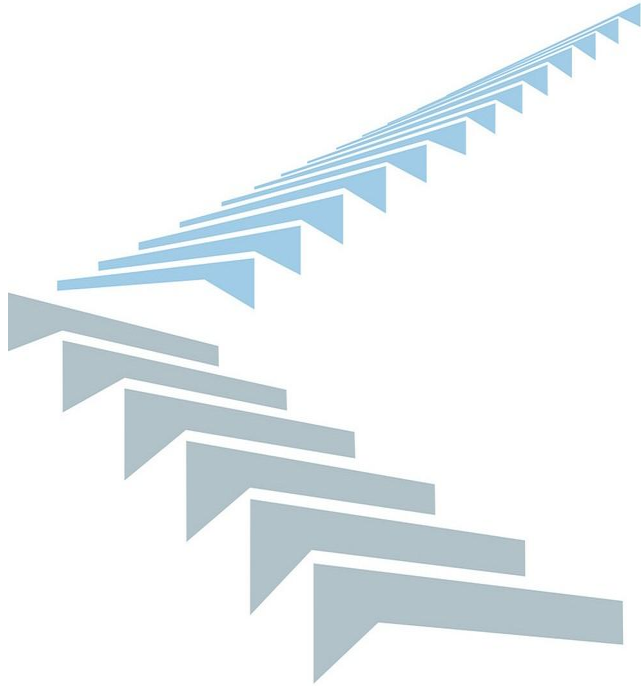
Both City & Resort Hotels are experiencing high cancellation rates, leading to reduced revenues and under-utilized rooms.

## Insights

Sharing key insights gained from the analysis, revealing patterns and correlations impacting cancellation rates.



# Data Analysis Workflow

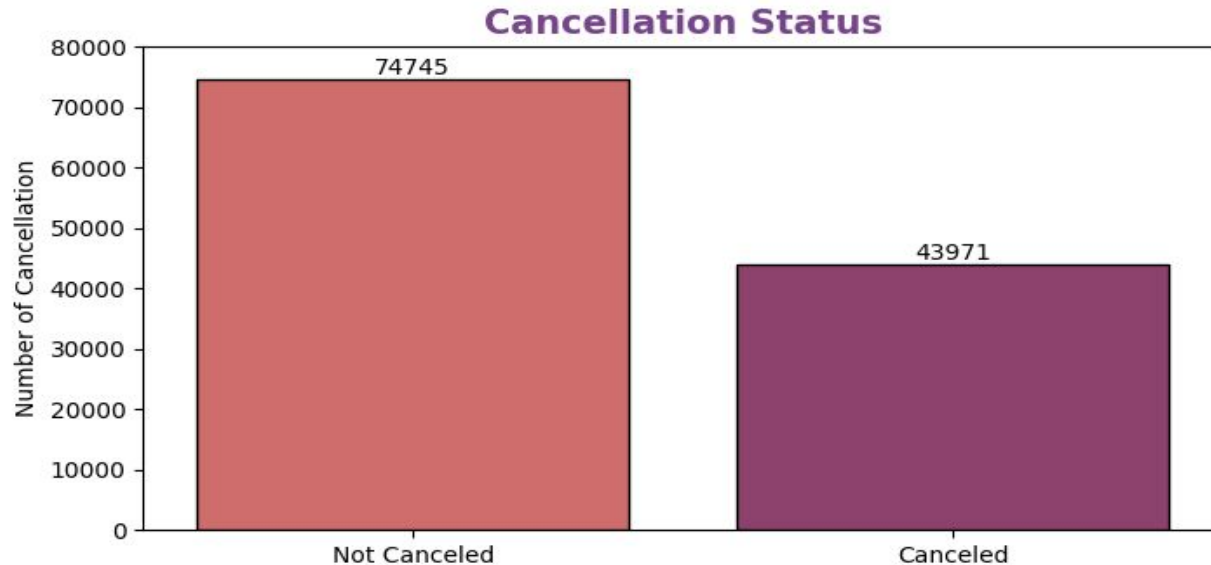


1. Understanding Business Problem
2. Converting problem to Data Analytics terms
3. Data Acquisition
4. Data Processing/Formatting (includes Data Cleaning & Modeling and Feature Engineering)
5. Data Analysis
6. Uncovering Insights

# Insights

This bar graph represents the distribution of hotel bookings categorized by their cancellation status.

Here, around 63% of the bookings were not canceled, while the remaining 37% were canceled.



This cancellation rate is significant, indicating a substantial impact it can have on revenue and bookings management for the Hotels if not minimized. Through in-depth analysis of this dataset, we can identify the key factors contributing to higher cancellation rates and propose viable solutions to address this problem.

# Hotel Booking Dataset

Resort Hotel  
39,595 Bookings

City Hotel  
79,121 Bookings

**72.02 %**  
Not-Canceled

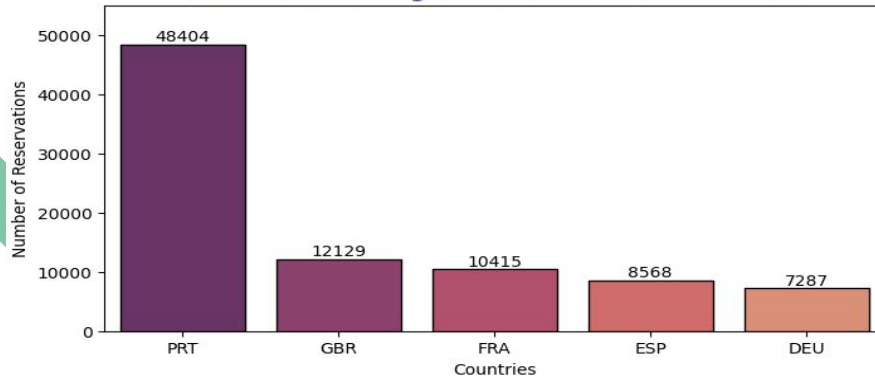
**27.98 %**  
Canceled

**58.42 %**  
Not-Canceled

**41.58 %**  
Canceled

- City Hotels have almost double the reservations compared to Resort Hotels. This might be due to the fact that Resorts might be more expensive than City Hotels.
- On the contrary, City Hotels have a higher cancellation rate than Resort Hotels. This suggests that customers booking City Hotels are more likely to cancel their reservations.

Countries with Highest Number of Reservations



→ Portugal (PRT) stands out with significantly more reservations than other countries in the top 5, making it the most popular destination among the bookings.

→ It has almost 4 times the reservations to the country in second place, the United Kingdom (GBR).

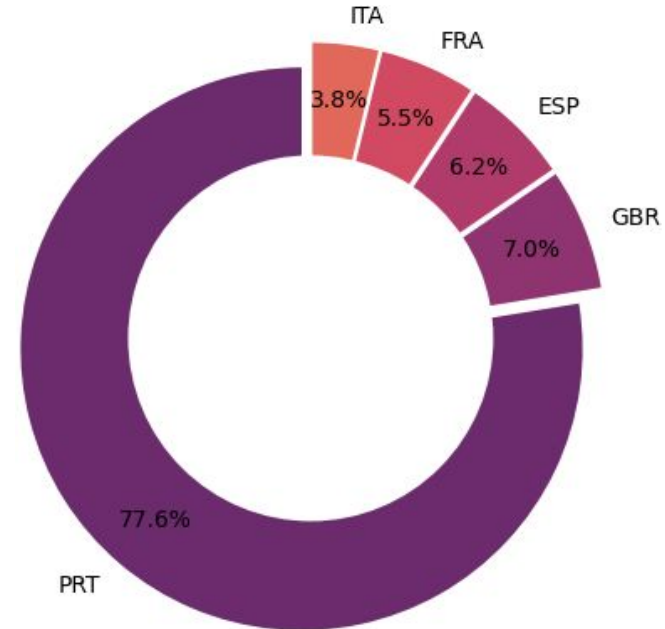
→ Portugal has the highest cancellation rate among the top 5 countries as shown in the Donut Chart.

→ Almost 56% of its reservations end up being canceled.


→ This indicates that despite Portugal's popularity, it also experiences a relatively high cancellation rate.

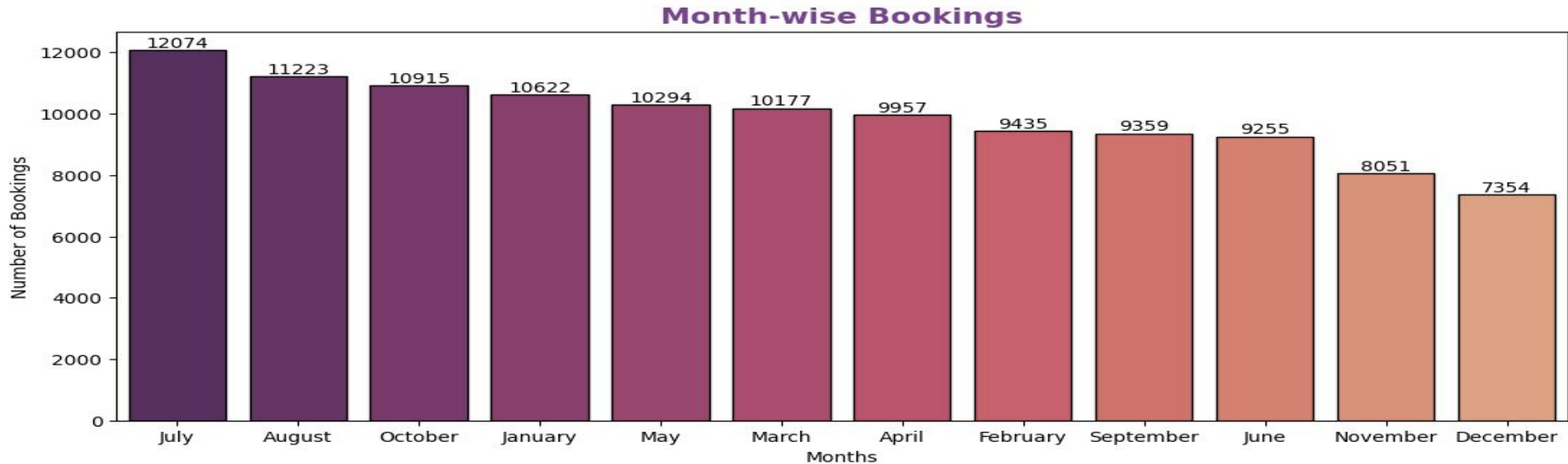
→ The United Kingdom has a substantial number of reservations, but its cancellation count is considerably lower than Portugal's. This suggests that bookings from the UK are more reliable than those from Portugal.

→ Same can be said for other countries in the top 5.




Countries with Highest Number of Cancellations

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- July & August are the months with the highest bookings, while December & November are the ones with the lowest bookings made by customers.
  - We can see that bookings seem to increase during the summer months (May, June, July & August) and decrease towards the end of the year (November & December).
  - This could suggest a seasonal impact on bookings.
- To obtain a clearer picture of booking trends over the months, it is essential to examine the distribution of canceled and non-canceled bookings month-wise.



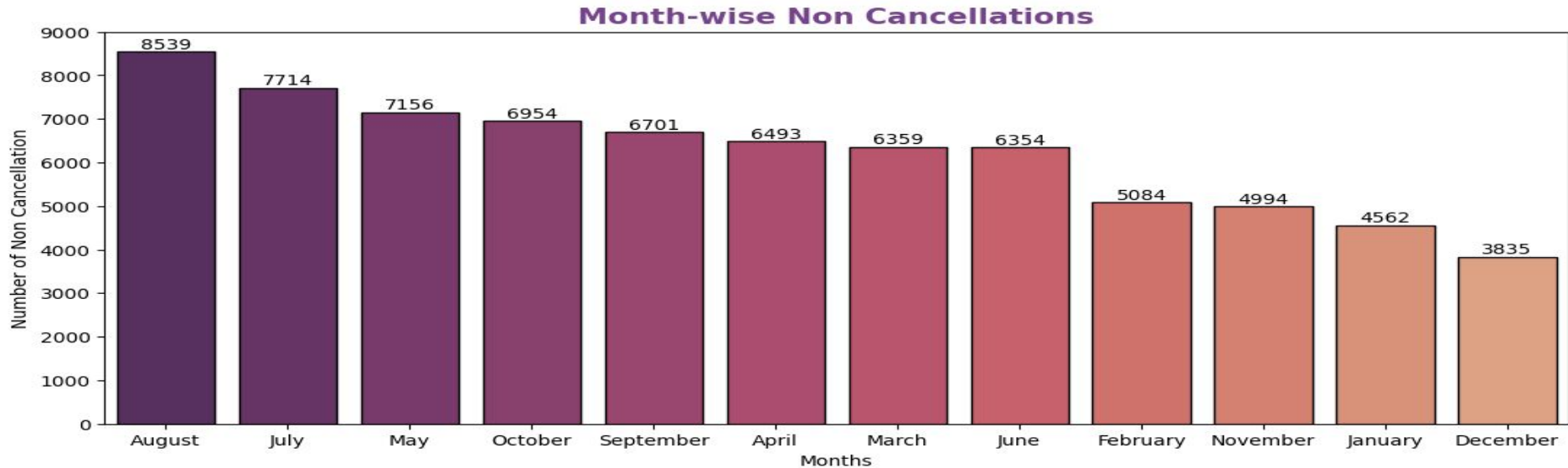





→ August is the month with the highest number of non-cancellations, indicating its popularity among customers for bookings. July & May follow as the next popular months.

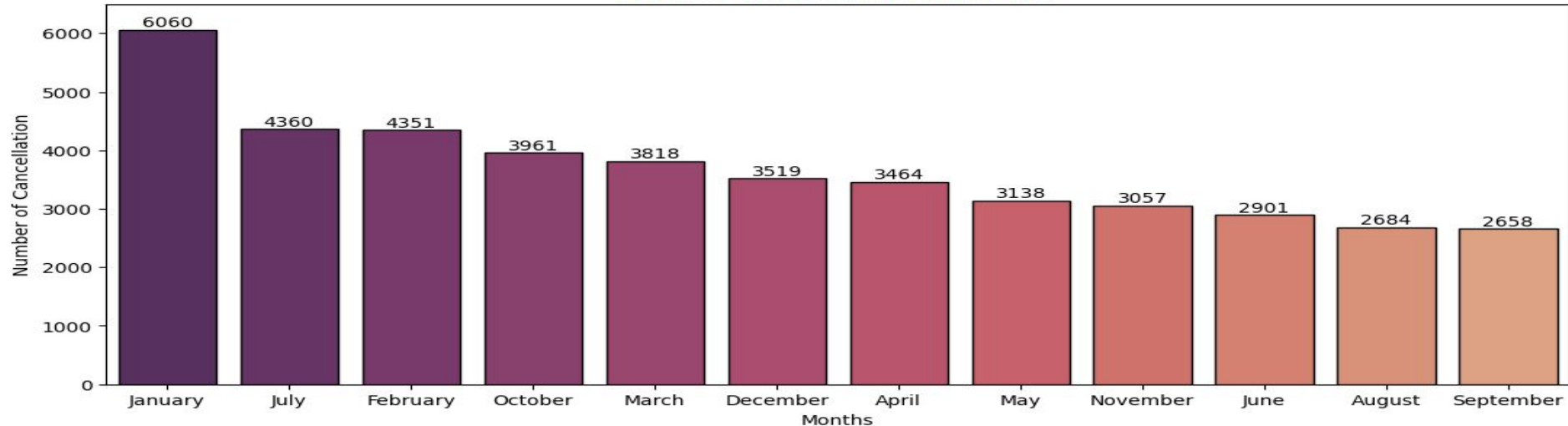
→ On the other hand, December has the lowest number of non-cancellations, followed by January & November. This suggests that customers are more likely to cancel their plans during these months.

→ We can notice a seasonal trend here, with higher non-cancellations during summer months, and lower numbers during winter months. Weather conditions, holidays, room availability or price seems to be the major factors influencing this trend.

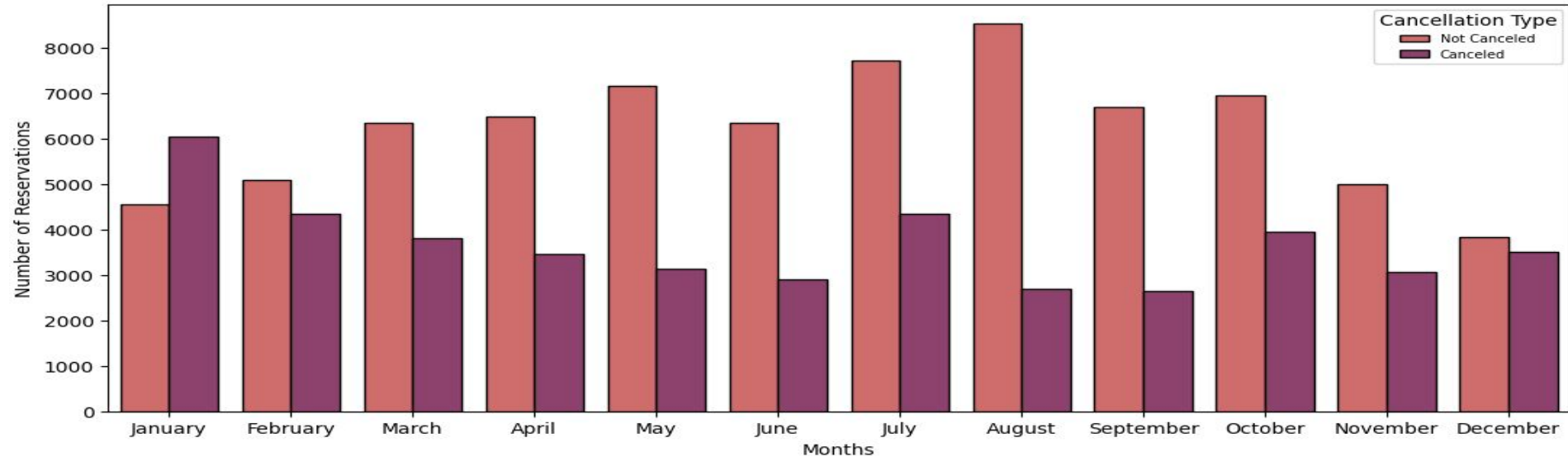


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- There is a clear seasonal variation in cancellations also. Months like January, July & February have relatively higher cancellations, while months like September & August have lower cancellations.
  - This suggests that certain periods experience higher booking fluctuations and uncertainties.
  - Higher cancellations in January & July indicates that they may be peak travel seasons with a high demand for bookings. Customers might make more reservations during these months, but also have a higher chance of cancelling due to changing plans, weather or price fluctuations.

**Month-wise Cancellations**



- This graph gives us a collective view of the monthly trend in bookings and cancellation status for the Hotels.
- By looking at the graph it seems that bookings peak in the months of July, August & October, while winter months see lower demand.
- January experiences more cancellation than its non-canceled bookings, while in August very less cancellations occur compared to non-cancellations.
- So, it is clear that seasons have an effect on the cancellations of the bookings at the Hotels.
- Further, we'll see if price also plays in the fluctuation of bookings in these months.



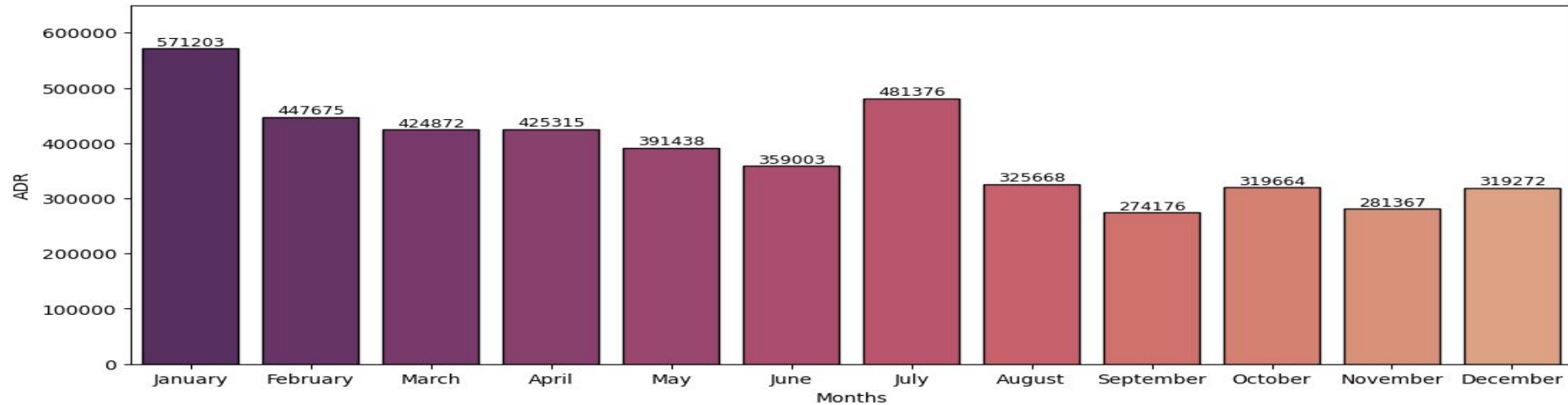


→ The graph shows the ADR (Average Daily Rate) variation across months for cancelled bookings. January has the highest ADR followed by July, which aligns with our observation that January had the highest cancellation rates followed by July.

→ For all the months which had a high cancellation rates, also have a high ADR.

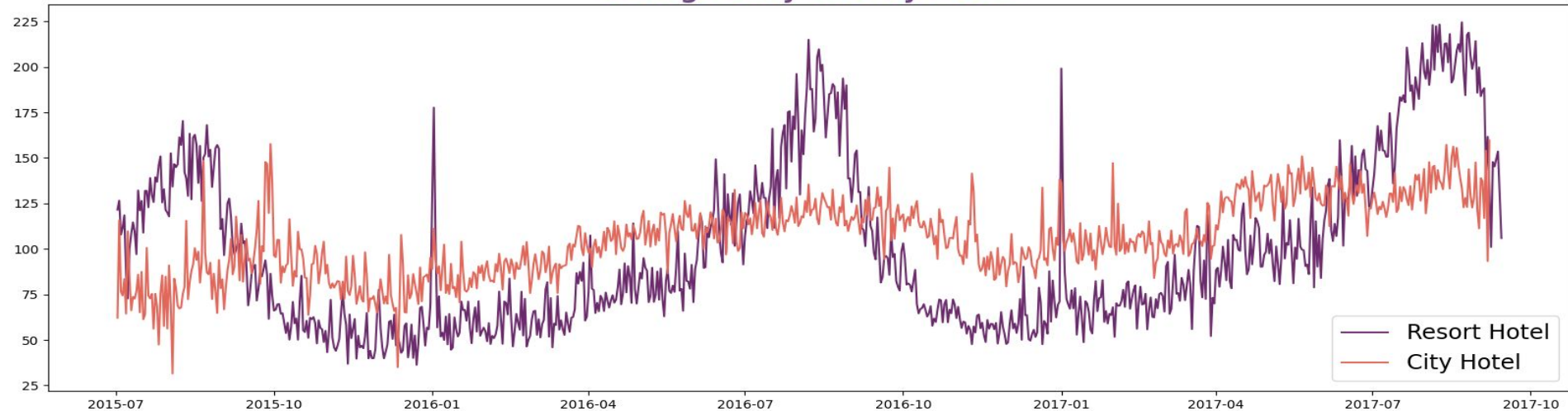
→ In a similar fashion, months with low cancellations and high non-cancellation rates have comparatively low ADR, except for July, which stands out with both high bookings and cancellation rates.

→ Thus, we can say that both prices and weather has an impact on the high cancellations, with July being an exception . As the only month falling in summer with high cancellation rate.



- The ADR for Resort Hotels seems to be higher than that of City Hotels, which might contribute to the lower reservation rates in the former.
  - During the months of August-September, Resort Hotels exhibit significantly higher ADR compared to City Hotels. Interestingly, this period experienced a low number of canceled bookings and a favourable non-cancellation rate.
  - There is also a noticeable spike in Resort Hotel's ADR in January, which coincide with a high number of bookings and cancellations during this period.
- The ADR for Resort Hotels is more volatile compared to that of City Hotels, with both experiencing a slight upward trend over time.

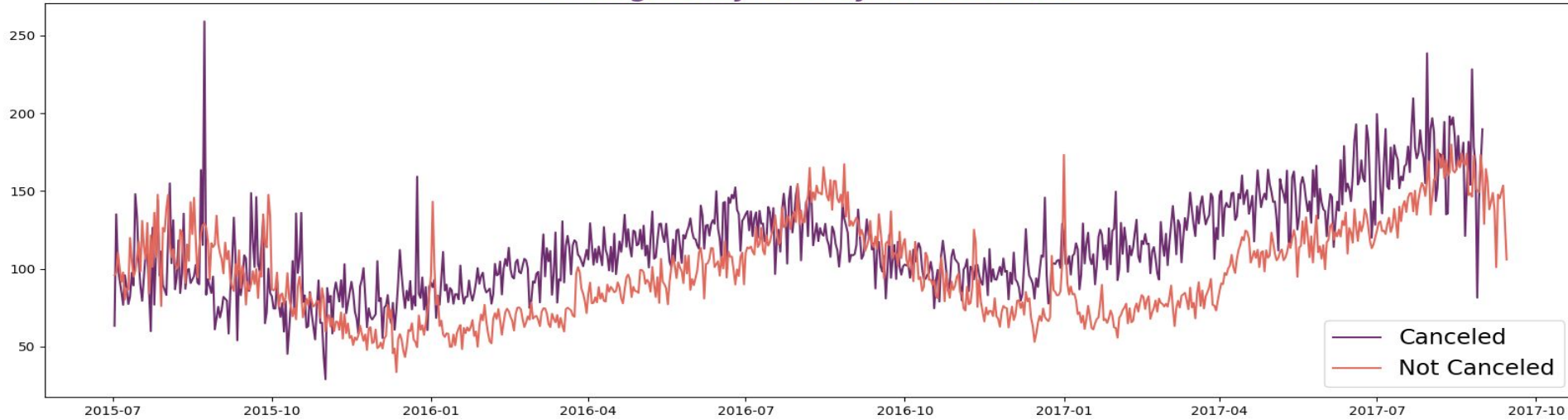
**Average Daily Rate by Hotels**



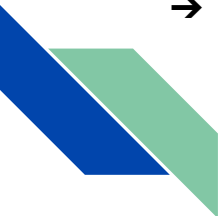
→ The ADR for canceled bookings seems to be higher than that of bookings that were not canceled, suggesting that an increase in prices may lead to rise in cancellation rates. There is also a slight upward trend for both over time.

→ From November to July, the ADR value is generally higher for canceled bookings, indicating customers price sensitivity during these months. An increase in price could potentially change their booking status from booked to canceled.

**Average Daily Rate by Cancellations**



→ ADR for bookings that were not canceled is higher during the months August-October (with comparatively lower cancellation rates), which in turn is still less compared to ADR for canceled bookings in other months. This shows that customers are more likely to stay in Hotels and not cancel their bookings during these months.



→ The violin plot displays lead time distributions for canceled and non-canceled bookings, combining a box plot and kernel density plot.

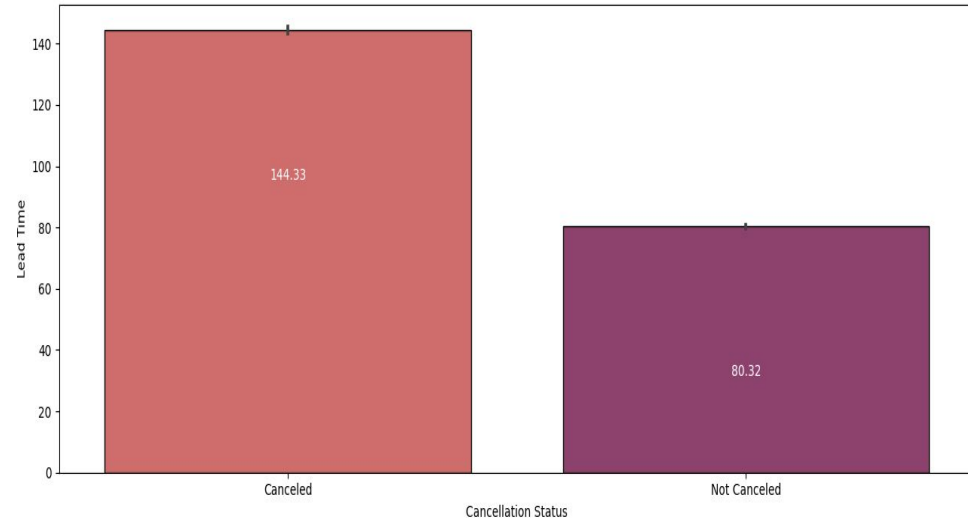
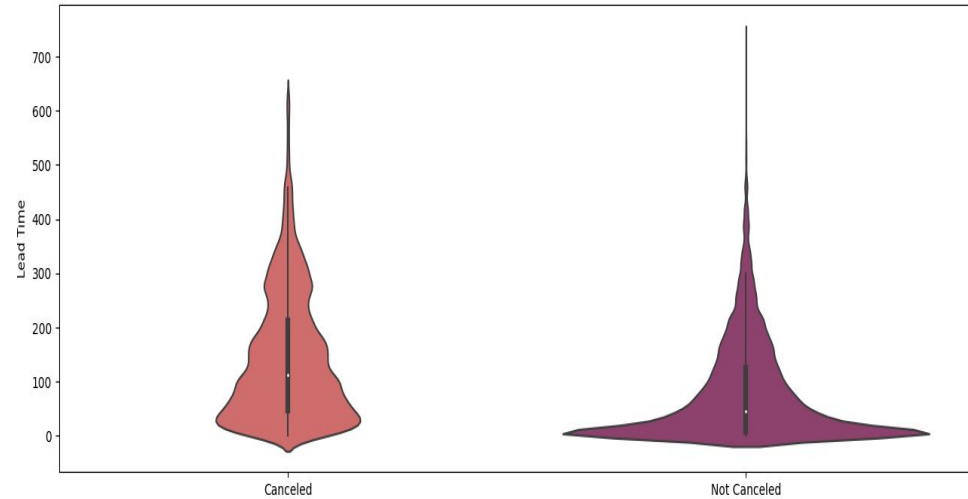
→ Canceled bookings seem to have a wider distribution with higher median lead time than non-canceled bookings.

→ It implies that canceled bookings have greater variation and longer lead times compared to non-canceled bookings.

→ Furthermore, the bar chart confirms that there is a substantial difference in lead times between canceled and non-canceled bookings, with canceled bookings having a higher average lead time.

→ This suggests that lead time significantly affects the booking status.

Correlation between Lead Time & Cancellation Status



→ There is a notable difference in the distribution of special requests between non-canceled and canceled bookings. Non-canceled bookings tend to have a wider range of special requests, while canceled bookings predominantly show 0 special requests.

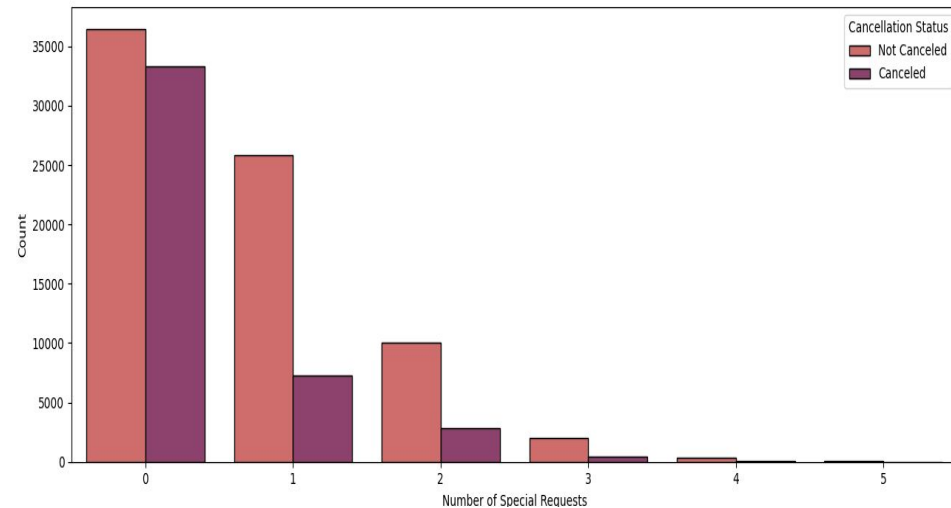
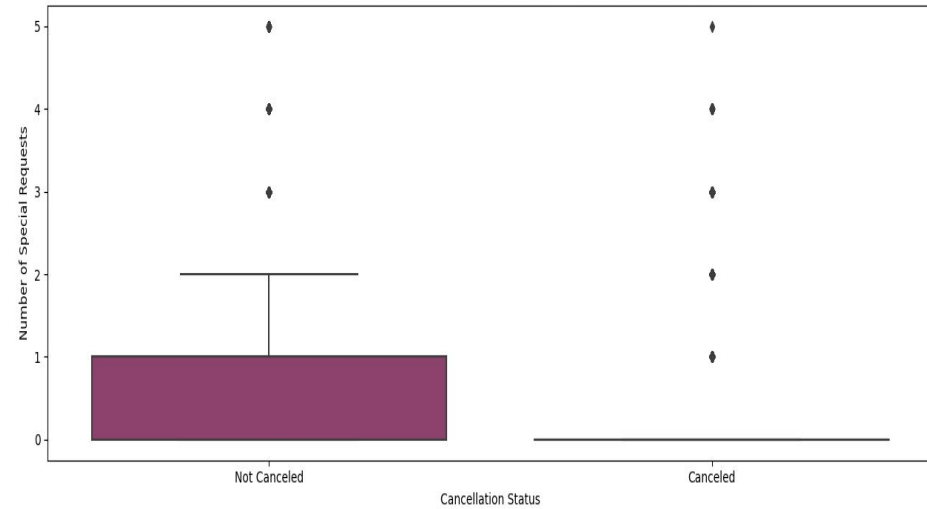
→ From the countplot, it is clear that bookings with no special requests constitute the majority of both non-canceled & canceled bookings.

→ 1 special request is the most common scenario leading to successful bookings with comparatively less cancellations.

→ Thus, it is evident that for non-canceled bookings, number of special requests mostly lies between 0 and 2 while it is almost entirely 0 in the case of canceled bookings.

→ This suggests that with increase in number of special requests, cancellation rates decreases dramatically.

Correlation between Special Requests & Cancellation Status





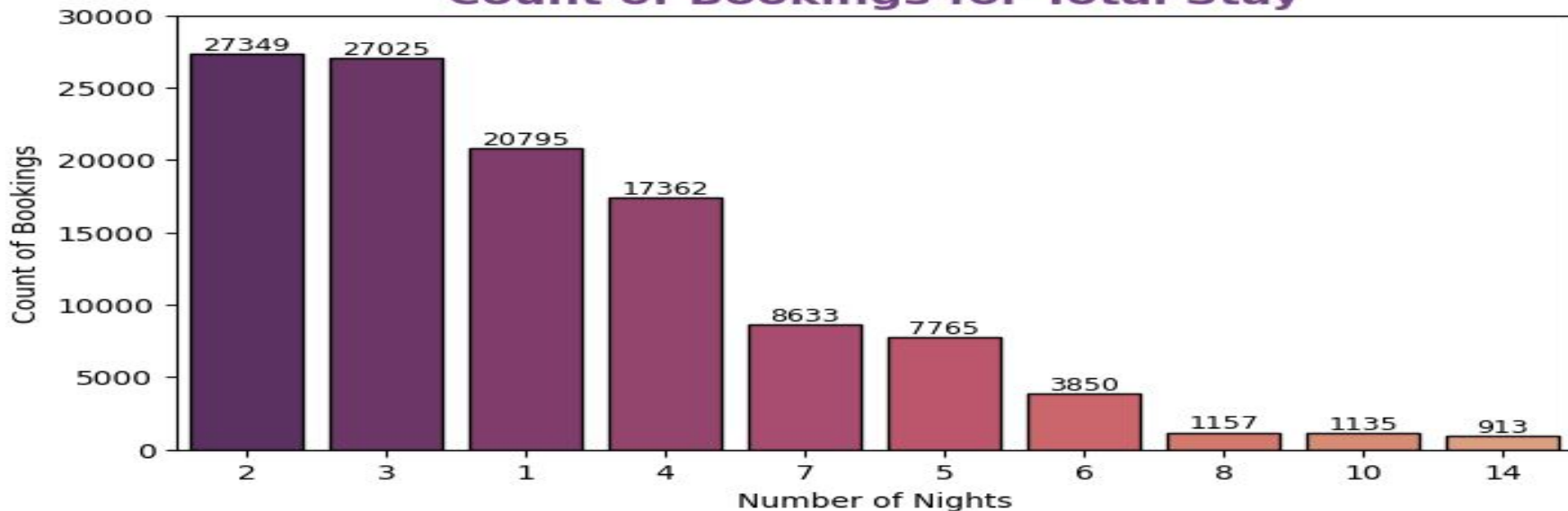
→ Bookings for 2 and 3 nights have shown the highest demand, indicating their popularity among the customers.

→ Customers tend to book stays for 1-4 days more commonly, indicating a preference for shorter trips.

→ Bookings drop significantly as the length of stay exceeds 4 nights, suggesting customers are less inclined to book longer stays.

→ Furthermore, it seems like longer stays are less common, likely due to factors like cost or work commitments.

**Count of Bookings for Total Stay**



→ Most common duration for week night stays is 2 nights, followed closely by 1 night and 3 nights. There is a gradual decline in bookings for stays longer than these afterwards.

→ This could be due to the fact that many travelers prefer shorter stays.

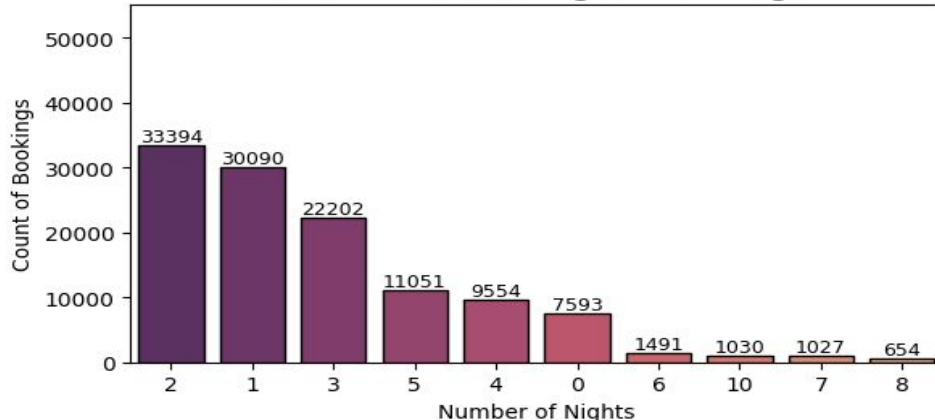
→ Bookings drop significantly for 6, 10, 7 & 8 week nights, indicating that these longer stays are less common.

→ A similar pattern can be seen in the case of weekend nights bookings. A substantial number of weekend stays are either day trips (0 nights or same day check-in/check-out) or 2 nights, with 1 being a close third.

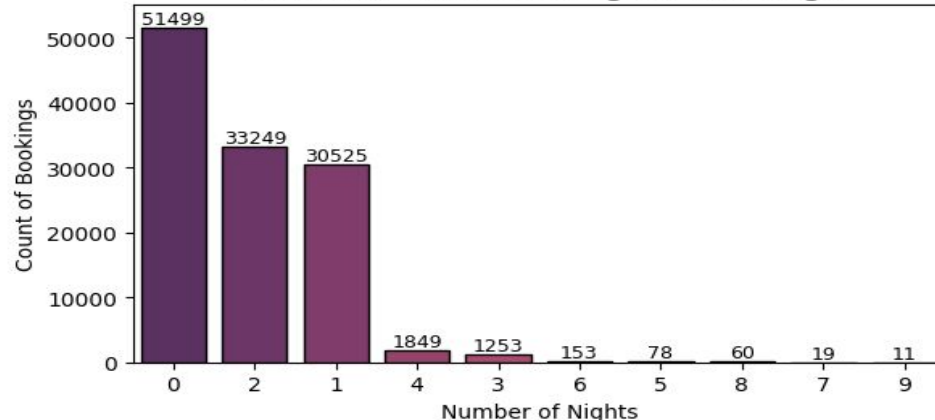
→ There is a much more significant drop in bookings for 4, 3, 6 and onwards for weekend nights.

### Top 10 Week vs Weekend Bookings

Count for Week Nights Bookings



Count for Weekend Nights Bookings



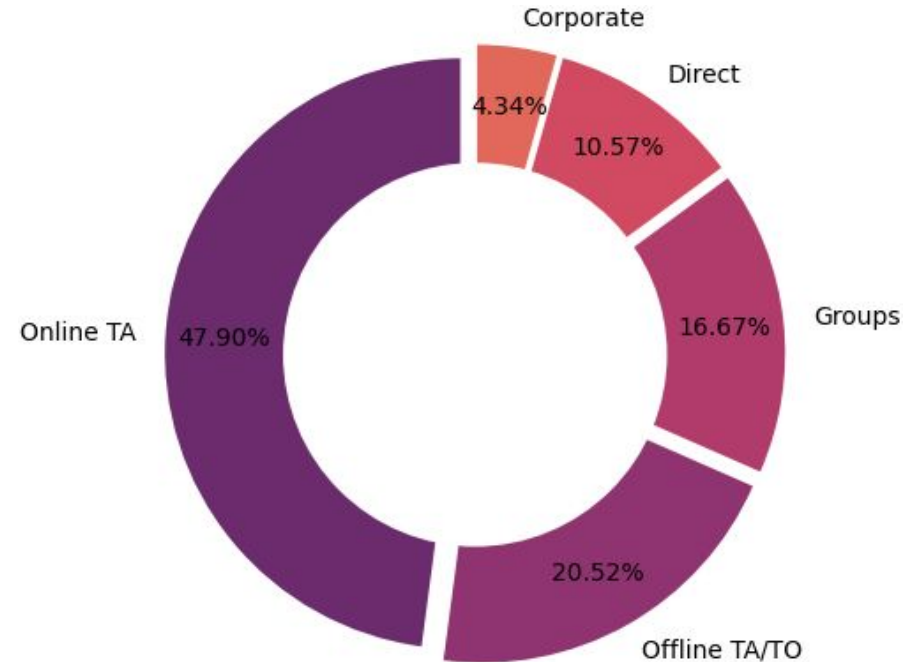
→ The fact that Online Travel Agencies (Online TA) represent nearly 50% of the market share suggests that many customers prefer the convenience and ease of booking hotels online.

→ Percentage of Offline TA/TO indicates that while online channels dominate, there is still a considerable share of the market that prefers traditional offline booking methods.

→ The market share for Group bookings suggests a notable demand for group travel arrangements, which can be a business conference, events, or leisure group trips.

→ Direct Bookings represent about 10% of hotel reservations. This suggests that a portion of customers prefers to book directly with the hotel underlining the importance of offering seamless and attractive direct booking options.

→ Corporate bookings make up about 4% of hotel reservations. This indicates that the hotel attracts business travelers, and they might have arrangements or partnerships with corporations for accommodation needs.



**Top 5 Market Segments**

## Overall Distribution for Types of Customers

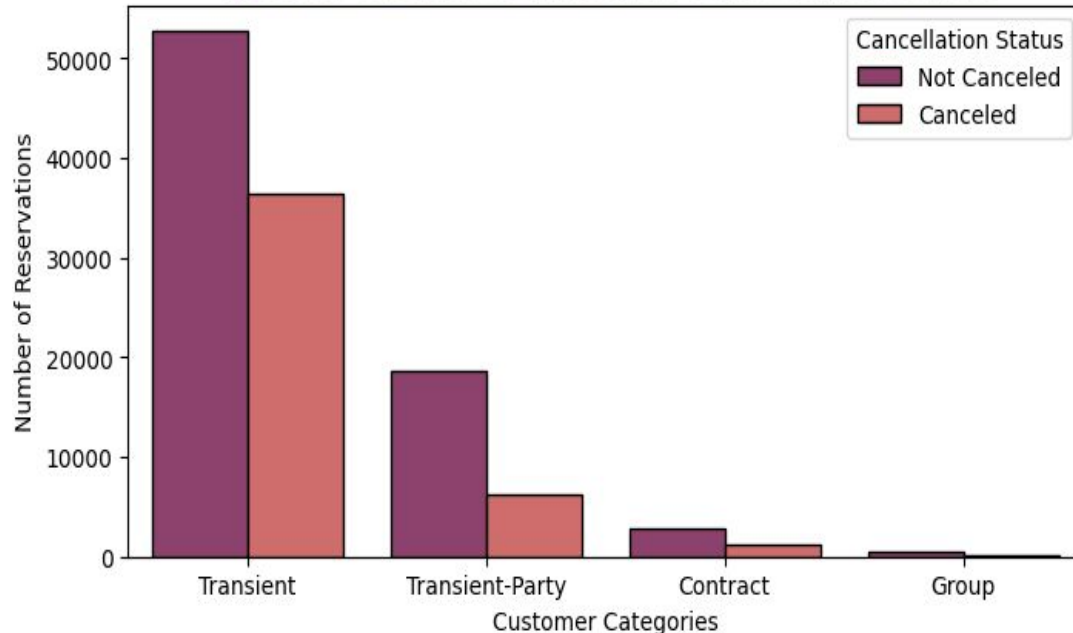
**75.1 %**  
**Transient**

**21 %**  
**Transient-Party**

**3.4 %**  
**Contract**

**0.5 %**  
**Group**

**Types of Customers with their Cancellation Status**



- The high proportion of Transient customers among the canceled reservations suggests that individuals or one-time guests may be more prone to canceling their bookings.
- On the other hand, the relatively lower cancellation rates for Transient-Party, Contract and Group customers might indicate that these bookings are more likely to be firm and less subject to last-minute changes.



## Overall Distribution for Repetition of Customers

**3.1 %**

**Repeated Customers**

**96.9 %**

**Non-Repeated Customers**

- The high percentage of “Non-Repeated” Customers implies that the hotel attracts a significant number of new customers, potentially indicating continuous efforts in attracting and engaging with new customers.
- On the other hand, the presence of lower number of “Repeated” Customers highlights the hotel’s inability to build customer loyalty, as only these customers have chosen to return and continue their engagement with the hotels.
- Nurturing and retaining repeat customers can lead to long-term business success and positive word-of-mouth marketing.



## Overall Distribution for Number of Previous Cancellations

**94.7 %**  
**0 Previous Cancellations**

**4.9 %**  
**1 Previous Cancellations**

**0.09 %**  
**2 Previous Cancellations**

**0.31%**  
**Other cancellations**

- The majority of reservations (around 95%) have no previous cancellations, suggesting that most customers either make their first booking with the hotel or have a history of reliable bookings without cancellations.
- The low percentages associated with 1 or 2 previous canceled bookings (4.9 & 0.09% respectively) suggest that instances of repeated cancellations are relatively uncommon.
- All the other cancellations only account for about 0.31% of the bookings, indicating cases with higher number of cancellations (i.e. above 2) are extremely rare.

→ The majority of customers, choose not to make any deposit during reservations. This suggests that a significant portion of customers prefers flexibility and may be comfortable paying the full amount upon arrival or during check-out.

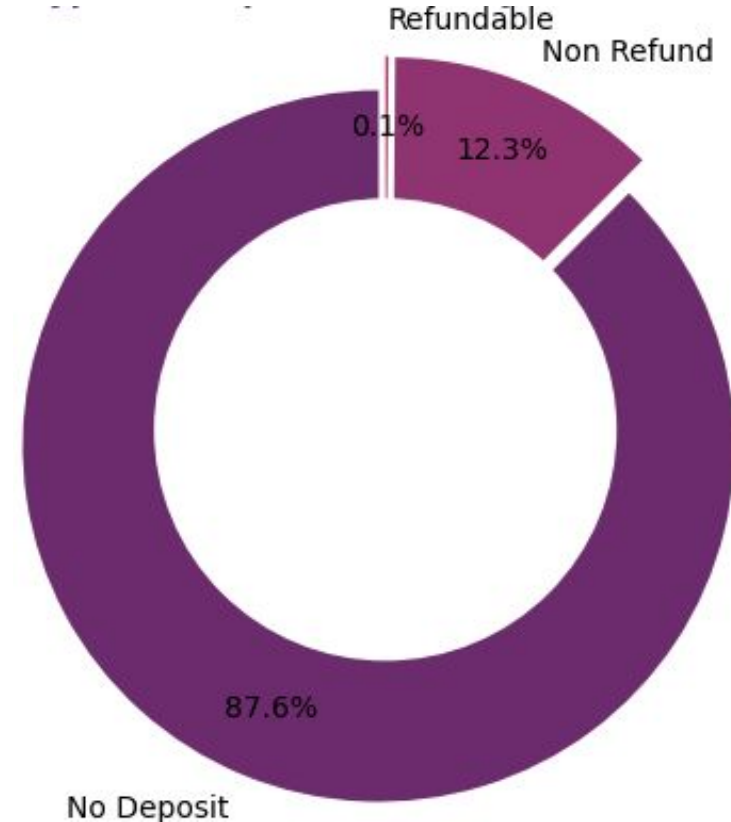
→ About 12% of customers opt for non-refundable deposits, where they pay the total cost of stay upfront.

→ This indicates that a considerable portion of customers is willing to commit to their bookings and secure the reservations by making a full payment in advance.

→ Only a very small percentage, around 0.1%, of customers opt for refundable deposits, where the deposit amount is less than the total cost of stay.

→ This suggests that most of the customers are not interested in making partial payments, they either prefer to pay in full or not make any deposit at all.

## Types of Deposits made by Customers

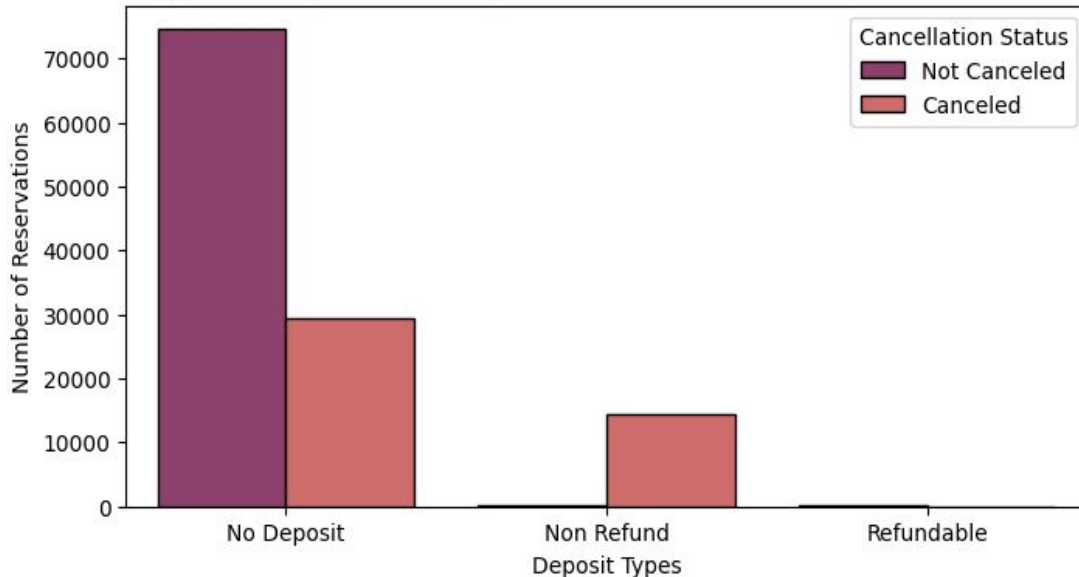


→ “No Deposit” reservations show moderate cancellations, implying a balance between committed customers and cancellations. Hotels could offer incentives to decrease cancellations while maintaining deposit-free bookings.

→ “Refundable” deposits display the lowest cancellations, indicating that customers who have the flexibility to make a partial deposit are more likely to keep their reservations.

→ Curiously, “Non-Refundable” deposits show the highest cancellations, potentially causing revenue loss for hotels when committed customers change their plans.

Types of Deposits made by Customers with their Cancellation Status



→ An unusually high cancellation rate for “Non-Refundable” deposits (99.4%), suggests an unusual customer behaviour. This trend contradicts the basic idea behind non-refundable deposits, which is to secure reservations and involve forfeit of deposit upon cancellation.

→ Thus, it raises question about the reasons behind this behaviour, as these deposits are traditionally designed to guarantee reservations and discourage cancellations.



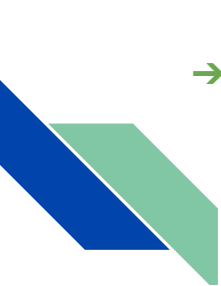
# Summary

- City Hotels having almost double the reservations, exhibit higher cancellation rates compared to Resort Hotels. Resort hotels generally have higher ADR, which might be why their reservation rates are lower.
- August & September's high ADR for Resort Hotels aligns with fewer cancellations and favourable non-cancellation trend. January's spike in Resorts ADR coincides with increased bookings and cancellation rates which could be due to the holiday demand, leading to more bookings but also more cancellations happening due to changing plans.
- Hotels could offer flexible booking options with minimal or no cancellation fees during peak periods, encouraging customers to book without the fear of losing money, thus giving them a peace of mind which might lead to more commitment towards the bookings.
- We can see that price heavily affects the cancellation rates. From November-July, ADR is generally higher for canceled bookings. Hotels can improve the situation by giving customers lucrative deals and flexible booking choices justifying the price. This can help reduce high cancellation rates and boost booking & hotel revenue.
- While ADR for bookings that were not canceled is higher during the months August-October (with comparatively lower cancellation rates). Lower cancellations even with high ADR during these months might indicate peak tourist season making customers more committed to their reservations. It presents an opportunity for Hotels to strategically price their rooms to increase revenue during this time period.




→ Talking about hotels, Portugal is the most sought-after destination with almost 4 times the reservations of the second place United Kingdom, but also occur the highest number of cancellations. Most of these cancellations occur during Winter months, coinciding with elevated pricing.

- To mitigate this, they can maybe strategically lower winter prices, provide customers with discounts, and offer special booking option with no-cancellations but with added benefits and perks.
- Next we can see that longer the Lead time, the greater the likelihood of cancellations.
- Hotels can tackle this by sending booking reminders for longer lead times, reinforcing commitment, and by following up with personalised messages closer to arrival, emphasizing unique benefits to reduce cancellations.
- Bookings with no special requests dominate both canceled and non-canceled categories. However, having just one or two special requests notably improves booking success, indicating potential for reduced cancellations with customized bookings.
- Hotels can consider promoting customizations like room & dietary preferences, room decorations and extra amenities for customers. Encouraging even a few requests could lead to fewer cancellations, boosting commitment and enhancing the booking experience.



→ Customers overall show a preference for shorter stays, with 2 and 3 nights being the most common choices, followed by 1 and 4 nights. Weeknights stays are often 2 nights long followed by 1 and 3 nights while weekend stays primarily consists of day trips (0 nights) followed by 1 and 2 nights.

- Hotels can tailor packages suiting passengers need for shorter stays like highlighting nearby attractions and under-the-radar spots. Hotels can also provide special perks for customers staying 4 nights or more to incentivize longer stays.
- We can see a diverse trend in ways customers make hotel reservations. From the top 5 ways, nearly 50% of customers prefer Online Travel Agencies (Online TAs) maybe due to the convenience of booking their stay from the comfort of their home, while about 20% of customers prefer Offline TA showing the significance of traditional methods. Following these, Group bookings account for about 17% of the reservations, direct bookings at the hotels with about 10% and finally corporate bookings account for nearly 3% bookings.
- Hotels can capitalize on the popularity of Online bookings by creating a more intuitive and simple to use UI for reservations, thus enhancing user experience and expanding their reach. Tailored assistance and exclusive deals can be provided to those who prefer offline methods like TA or directly booking from Hotel to get more engagement from these markets. Hotels can also develop curated group packages like leisure trips for group bookings and can provide corporate rates, business centric amenities like fast wifi, meeting spaces, ergonomic workspaces to establish themselves as prime choices for corporate accommodations.

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- The distribution of customer types reveals that Transient customers constitute the majority, followed by Transient-Party, Contract and finally Group bookings. Interestingly, Transient customers also contribute the highest cancellations.
  - On the other hand, when customer books in groups like for Transient-Party and Groups or under contracts, they tend to have a stronger commitment to their reservations.

- Hotels can implement more flexible cancellation policies to accommodate changing plans of the customers. Moreover, introducing group-specific benefits, such as discounts or added amenities, encourages group travel and helps minimize cancellations. Additionally, customizing services in accordance with contract terms could be well received by corporate clients, forging a stronger relationship in doing so.
- Looking at the customers, most are new or non-repeated (almost 97%), showing hotel's effort on attracting new customer base. But few repeats (only about 3%) suggests that they need to work on keeping customers coming back for long-term success.
- Hotels can introduce loyalty programs offering incentives and rewards for repeat stays, encouraging customers to return. They can also provide additional amenities or services exclusively for repeat customers, giving them something to look forward in their next visits.
- By understanding this difference, hotels can establish a loyal customer base, leading to sustained success and positive referrals.



→ Examining the deposit types reveals the following distribution: 87.6% of customers preferred to make “No Deposit”, 12.3% preferred to make “Non Refund Deposit” while only 0.1% of customers preferred to make a “Refundable Deposit”.

- “No Deposit” bookings strike a balance between committed customers and cancellations. “Refundable Deposits” have the lowest cancellations, which highlights the importance of flexibility in bookings. “Non Refundable Deposits” experiences very high cancellations, questioning the very basic idea of a non-refundable booking.
- Hotels can incentivize commitment by providing additional benefits to customers who opt for paying any kind of deposit in advance during the booking. They also need to investigate why so many customers opting for non-refundable deposits are canceling their bookings, as this type of deposit should have lowered the cancellation rates and not increase it. Additionally, they can verify the accuracy of the data acquired in order to get accurate insights.
- And at last, the analysis also reveals that Bed & Breakfast is the top choice for the meal type opted during booking, followed with a substantial difference in numbers by Half Board, Self-Catering and lastly a small number of Full Board Meal.
- Bed & Breakfast seems to be the default choice for majority of customers, thus hotels can capitalize on its popularity by offering appealing breakfast-inclusive packages. To diversify the offerings and potentially increase revenue, hotels can emphasize the value in meal types like Full or Half Board alongside the flexibility of Self-Catering options. This strategy offers customers added comfort and a range of dining options.



# Actionable Strategies

1. **Influential Factors** : Price and Weather majorly impacts cancellations. Flexible booking options during peak periods can help reduce cancellations.
2. **Strategic Pricing** : By adjusting ADR to match peak tourist seasons, hotels can optimize room pricing for increased revenue, while also keeping cancellations at a minimum.
3. **Lead Time Management** : Hotels can reinforce commitment for longer lead times by sending reminders and personalized messages, minimizing cancellations.
4. **Customization Advantage** : Offering customizable bookings with added benefits and amenities can lead to fewer cancellations, enhancing commitment.
5. **Optimizing the Stay length** : Hotels can tailor packages for shorter stays and incentivize longer stays, attracting a diverse customer base and thus boosting revenue.
6. **Customer Engagement** : Targeting specific types of customers , such as introducing group specific benefits and loyalty programs can enhance commitment and business.
7. **Meal Plans** : Capitalizing on “Bed & Breakfast” popularity with attractive packages, while diversifying meal plan options, can enhance customer satisfaction and give revenue boost.



# Thank You!

Any Questions?