INN Hotels Project Business Presentation

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Business Problem Overview and Solution Approach

- INN Hotels Group has a chain of hotels in Portugal. They are facing problems with the high number of booking cancellations.
- A significant number of hotel bookings are called off due to cancellations or no-shows. The typical reasons for cancellations include change of plans, scheduling conflicts, etc. This is often made easier by the option to do so free of charge or preferably at a low cost which is beneficial to hotel guests but it is a less desirable and possibly revenue-diminishing factor for hotels to deal with. Such losses are particularly high on last-minute cancellations.
- The new technologies involving online booking channels have dramatically changed customers' booking possibilities and behavior.
- The task at hand to analyze the data provided to find which factors have a high influence on booking cancellations, build a predictive model that can predict which booking is going to be canceled in advance, and help in formulating profitable policies for cancellations and refunds.

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Data Overview

- The data contains information about 36275 booking records.
- The characteristics include number of adults, number of children, average price per room, type of meal plan selected, number of special requests from a customer and more.
- Some columns (like average price per room, number of children) have some extreme and irregular values, which warrants an anomaly check.

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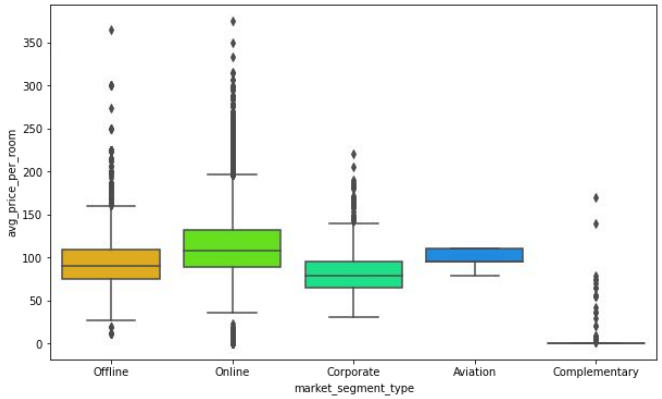
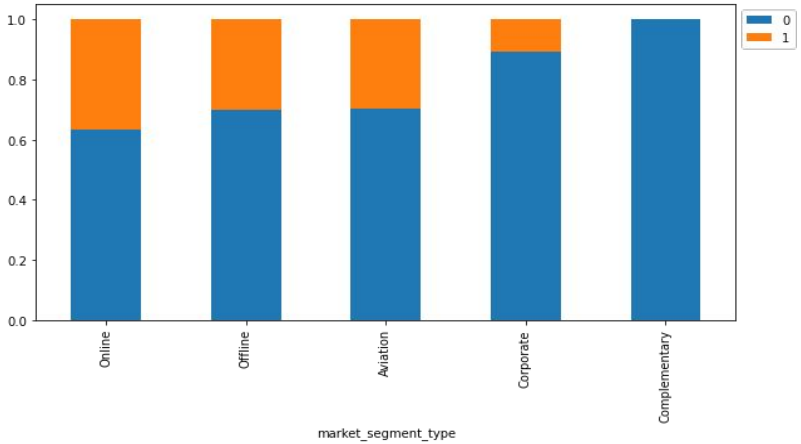
Exploratory Data Analysis



- Rooms booked online have high variations in prices.
- The offline and corporate room prices are similar.
- Complementary market segment gets the rooms at very low prices, which makes sense.

- Around 40% of the online booking were canceled.
- Bookings made offline are less prone to cancellations.
- Corporate segments show very low cancellations.



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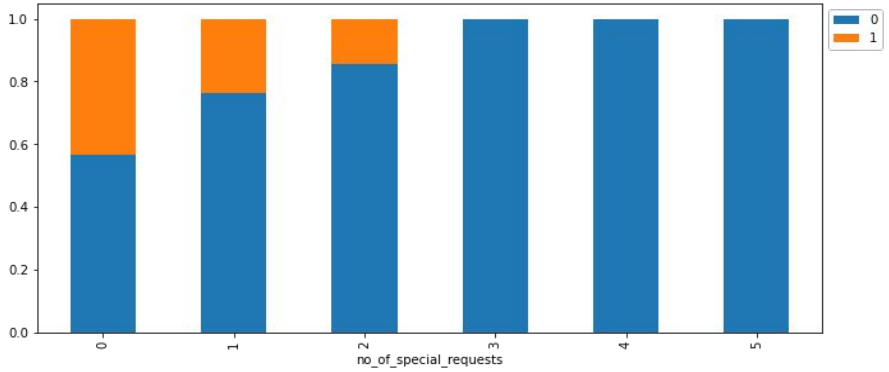
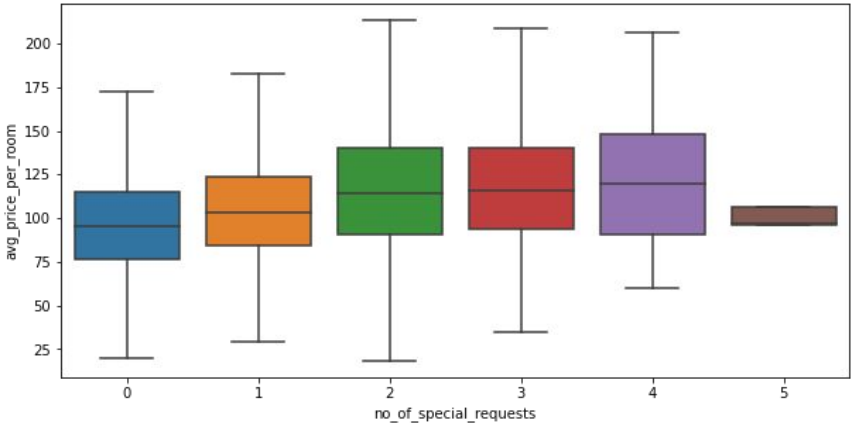
Exploratory Data Analysis

- There's a negative correlation between the number of special requests from the customer and the booking status.
- If a customer has made more than 2 requests there's a very high chance that the booking will not be canceled.



- The median prices of the rooms where some special requests were made by the customers are slightly higher than the rooms where customer didn't make any requests.



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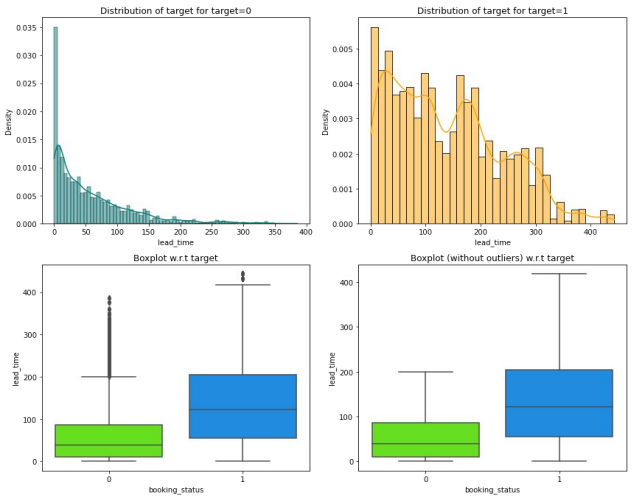
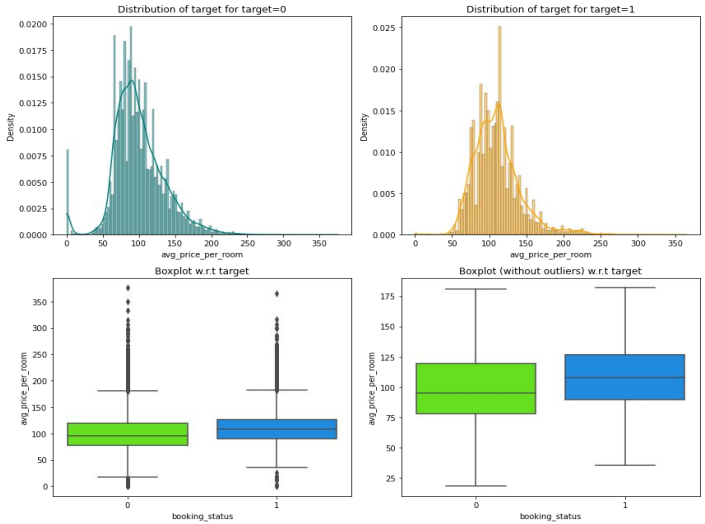
Exploratory Data Analysis



- There's a big difference in the median value of lead time for bookings that were canceled and bookings that were not canceled.
- Higher the lead time higher are the chances of a booking being canceled.



- The distribution of price for canceled and booking which were not canceled is quite similar.
- The prices for the canceled bookings are slightly higher than the booking which were not canceled.

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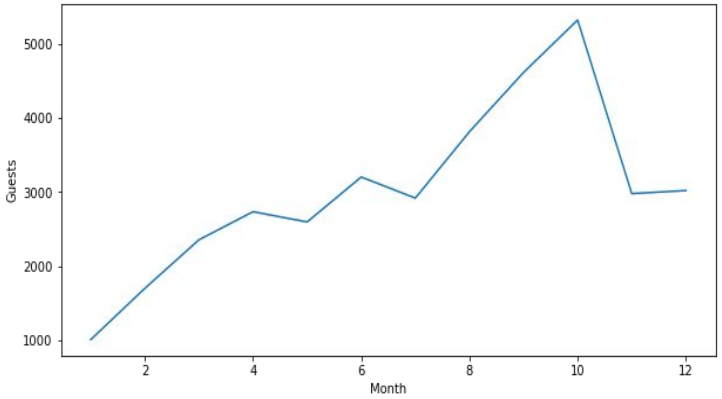
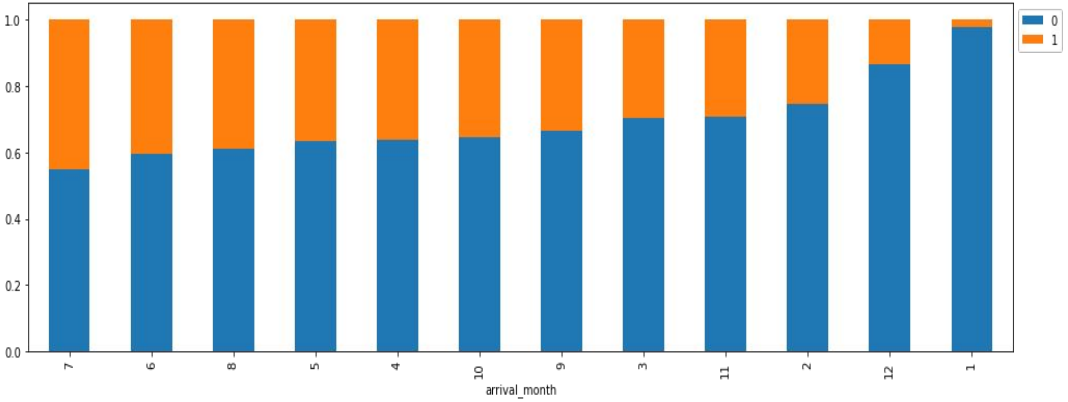
Exploratory Data Analysis

- The trend shows the number of bookings remains consistent from April to July and the hotel sees around 3000 to 3500 guests.
- Most bookings were made in October - more than 5000 bookings but 40% of these bookings got canceled.
- Least bookings were canceled in December and January - customers might have travelled to celebrate Christmas and New Year.





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Model Performance Summary

- We want to predict whether a booking will be cancelled or not using the information provided to us.
- We will use F1 Score as the performance metric for our model because
  - If we predict that a booking will not be canceled and the booking gets canceled then the hotel will lose resources and will have to bear additional costs of distribution channels.
  - If we predict that a booking will get canceled and the booking doesn't get canceled the hotel might not be able to provide satisfactory services to the customer by assuming that this booking will be canceled. This might damage the brand equity.
  - F1 score will help use minimize both false positives and false negatives
- The Logistic Regression and Decision Tree models indicates that the most significant predictors of booking status are:
  - Lead Time
  - Number of special requests
  - Average price per room

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Model Performance Summary

Model	Train Accuracy	Test Accuracy	Train Recall	Test Recall	Train Precision	Test Precision	Train F1	Test F1
Logistic regression	0.80	0.80	0.63	0.63	0.73	0.72	0.68	0.67
Logistic Regression (threshold = 0.31)	0.77	0.78	0.78	0.78	0.62	0.63	0.69	0.70
Logistic Regression (threshold = 0.42)	0.79	0.80	0.69	0.70	0.69	0.68	0.69	0.69
Decision Tree	0.99	0.87	0.98	0.81	0.99	0.79	0.99	0.80
Decision Tree - Pre Pruning	0.83	0.83	0.78	0.78	0.72	0.72	0.75	0.75
Decision Tree - Post Pruning	0.89	0.86	0.90	0.85	0.81	0.76	0.85	0.80

Best performing model

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Business Insights and Recommendations

- The hotel can take the following actions for the customers who have booked more than 151 days in advance:
  - Set up a system that can send a prompt (like an automated email or app notification) to the customers 90 days before the arrival date asking for a re-confirmation of their booking and any changes they would like to make in their bookings.
  - Remind guests about imminent deadlines 1 month prior to the date of arrival.

  The response given by the customer will give the hotel ample time to re-sell the room or make preparations for the customers' requests.

- Stricter cancellation policies can be adopted by the hotel.
  - The bookings where the average price per room is high, and there were special requests associated should not get a full refund as the loss of resources will be high in these cases.
  - Ideally the cancellation policies should be consistent across all market segments but as noticed in our analysis high percentage of bookings done online are cancelled. The booking cancelled online should yield less percentage of refund to the customers.

  The refunds, cancellation fee, etc should be highlighted on the website/app before a customer confirms their booking to safeguard guests' interest.

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Business Insights and Recommendations

- We saw in our analysis that bookings, where the total length of stay was more than 5 days, had a higher chance of getting canceled. The hotel can restrict booking duration up to 5 days only with an option for customers to book an extension in case they are willing to extend their stay. Such restrictions can be strategized by the hotel to generate additional revenue and can be relaxed for certain market segments (like Corporate and Aviation) such that it does not hamper their experience with the hotel.
- In the months of December and January cancellation to non-cancellation ratio is low. Customers might travel to celebrate Christmas and New Year. The hotel should ensure that enough human resources are available to cater to the needs of the guests.
- October and September saw the highest number of bookings but also high number of cancellations. This should be investigated further by the hotel.
- Improving the experience of repeated customers.
    - A loyal guest is usually more profitable for the business because they are more familiar with offerings from the hotel they have visited before.
    - Attracting new customers is tedious and costs more as compared to a repeated guest.
    - A loyalty program that offers - special discounts, access to services in hotels, etc for these customers can help in improving their experience

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