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Hotel Booking Demand Prediction

Section C Team #61

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Business Understanding

Business Problem	Data Mining Solution	Business Value
• Cancellations lead to revenue loss, poor utilization, and operational efficiency problems • In the dataset, 37%were canceled before the arrival date accounting for 16 M euros of lost revenue	Predict whether a customer will cancel the hotel booking or not	Increase efficiency and profit by overbooking

Data Understanding

- The dataset contains hotel bookings from various countries between 2015 – 2017

- Features/Attributes
  - Demographics: country, customer type, adults, children, babies,...
  - Booking Information: lead time, arrival date week number, previous cancellations, previous bookings not canceled, booking changes, ADR(Average Daily Rate),...
  - Services: meal, market segment, distribution channel, ...
  - Hotel type: hotel
- Target
  - is_canceled (0/1)

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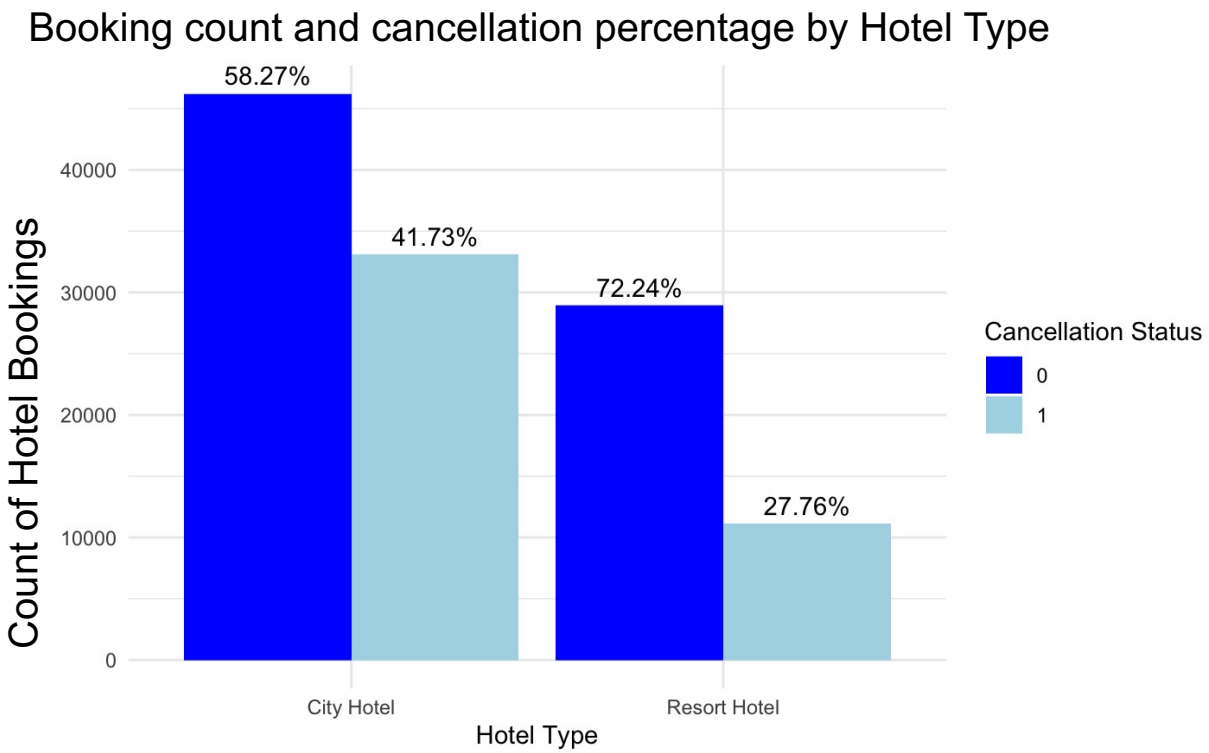
Data Visualization



- More bookings in a city hotel when compared to the resort, cancellation percentage is also higher.
- Resort hotels: customers usually planned in advanced for traveling purpose and has lower possibilities to cancel

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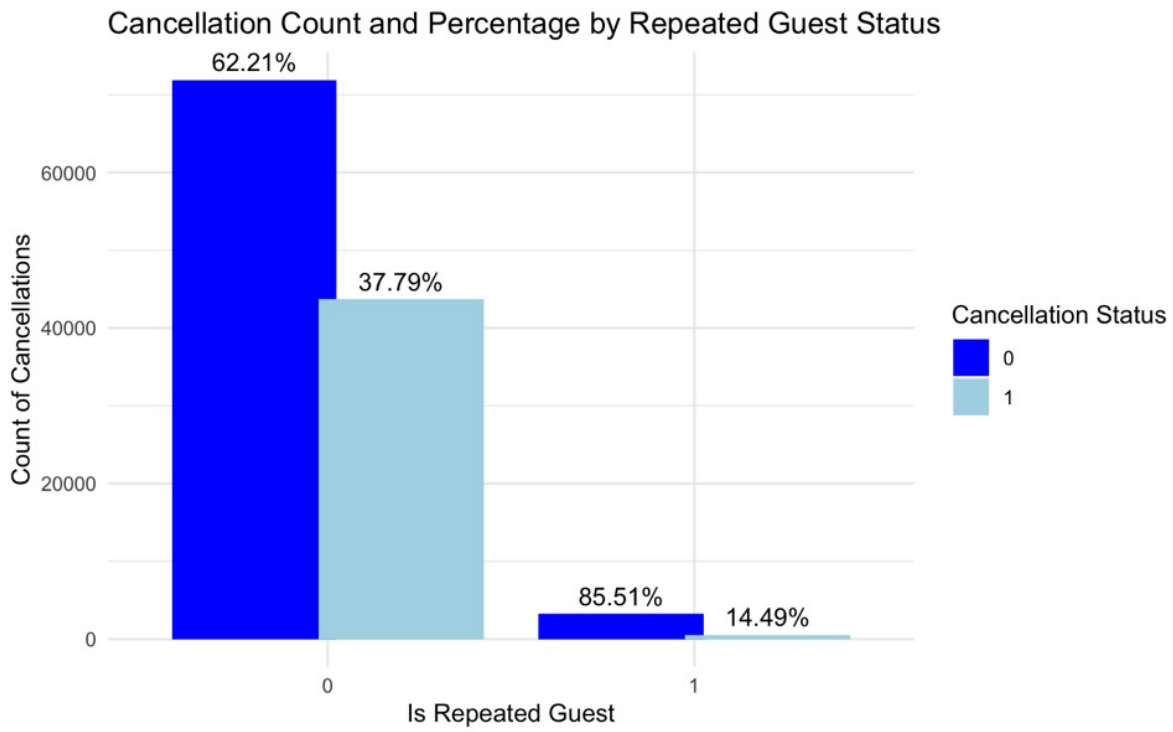
Data Visualization



- Repeated guests are less likely to cancel the bookings. This might be because the customers are loyal, or they might be frequent visitors for work purposes

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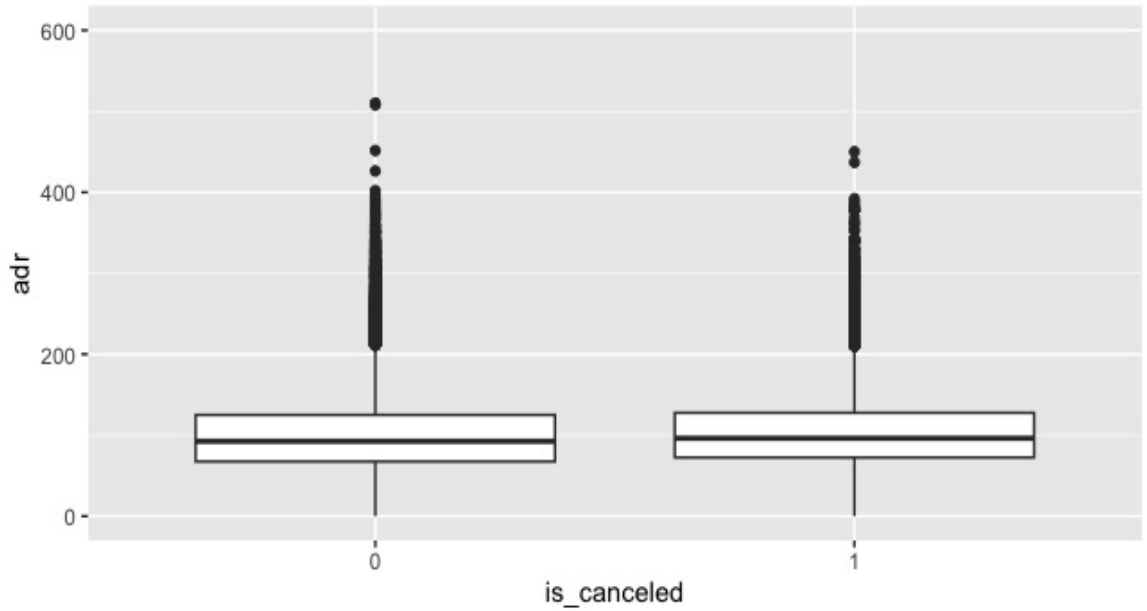
Data Visualization



- Hotel's average daily rate didn't significantly affect the cancellation action.

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Modeling

- Binary prediction: Utilize supervised learning models for classification purpose
- Cross-validation: K-fold cross-validation
- The performance metrics: OOS Accuracy

Model	OOS Accuracy
Logistic Regression	**81.43%**
SVM	**82.84%**
Classification Tree	**80.30%**
XGBoost	**84.09%**

- Prediction Result: 84.378%

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K-means Clustering

	is_ canceled	lead_time	arrival_date_day _of_month	adults	children	babies	is_repeated_ guest	adr
1	0.348	43.285	16.159	2.020	0.278	0.012	0.011	166.994
2	0.249	31.320	15.562	1.718	0.043	0.007	0.0642	75.273
3	0.451	160.728	16.040	1.911	0.096	0.007	0.004	103.189
4	0.644	326.526	15.488	1.945	0.047	0.003	0.015	85.041

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Deployment

- The results from the data mining should be used to predict whether the customer cancel the booking or not
- By calculating the percentage of booking rate minus the cancellation, the hotels would be able to release certain percentage of rooms for overbooking
- Mitigate the risk of overbooking problems by setting conservative overbooking thresholds and partnering with other local hotels

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