**Data Mining Hotels Project**

This report delves into the comprehensive analysis of a hotel booking log, a detailed dataset encapsulating the intricacies of hotel reservations. The dataset consists of 27,213 entries, each meticulously documenting various aspects of bookings, including the number of weekend and weeknight stays, room types, board types, and guest demographics such as adults and children of different age groups. Additionally, it captures important variables like lead time, purchase type (online or offline), number of special requests, and past cancellation history. Key financial details like the booking price and the dates of the bookings are also included. This extensive data not only provides a snapshot of individual bookings but also offers insights into broader booking patterns and trends. By examining this dataset, one can understand the factors influencing customer choices and booking behaviors. Such analysis is crucial for optimizing hotel management strategies and improving customer satisfaction. The subsequent sections of this report will focus on leveraging this rich dataset to extract actionable insights.

The primary objective of this report is to conduct a thorough analysis of the given dataset, employing various preprocessing techniques and advanced classification methods to derive meaningful predictions. Initially, the dataset will undergo meticulous preprocessing, including handling missing values, outlier detection, and normalization of data to ensure accuracy and consistency. Following preprocessing, exploratory data analysis (EDA) will be performed to uncover hidden patterns and relationships within the data, providing a foundation for the predictive models. The core of the analysis involves applying classification algorithms such as Logistic Regression, Decision Trees, and Random Forest to predict key outcomes like booking cancellations. Each method will be evaluated based on its performance metrics, including accuracy, precision, recall, and F1 score, to identify the most effective model. The insights gained from these predictions will offer valuable guidance for hotel management to anticipate cancellations and optimize booking strategies. Furthermore, this report will discuss the implications of these findings and recommend actionable steps for improving hotel operations. Through this comprehensive approach, the report aims to enhance the understanding and management of hotel bookings.

**Show the data information**