Boosting Operational Efficiency in Hospitality

The objective of the project is to analyze a hotel dataset to optimize various aspects of operations, boost revenue streams, and create a more efficient and satisfying experience for guests.

Extract actionable insights from the provided data, focusing on key areas such as booking patterns, customer behavioral segmentation, operational efficiency, and more.

The hospitality industry is a dynamic and data-driven sector, where hotel data analysis plays a crucial role in understanding guest behavior, optimizing operations, and boosting revenue. Hotels can gain valuable insights into booking patterns, booking cancellation analysis, customer behavioral segmentation, revenue management, operational efficiency, Loyalty Programs and Repeat Business, Customer Satisfaction, Marketing and Sales Optimization by analyzing vast amounts of given data.

This knowledge empowers informed decision-making, leading to improved guest satisfaction, increased revenue streams, and streamlined operations.

Adam, a skilled data analyst at the leading data analytics company ABC.Inc., has been tasked by the company's manager to analyze a massive dataset of hotel bookings to identify trends and patterns. However, the large volume of data and the complexity of user behavior pose challenges in extracting meaningful insights manually.

Click here to download the hotel booking dataset.

Data Dictionary: Hotel Booking Data

Column Name	Description
hotel	Type of hotel (e.g., Resort Hotel)
is_canceled	Binary variable indicating whether the booking was canceled (1) or not (0)
lead_time	Number of days between booking and arrival
arrival_date_year	Year of arrival date
arrival_date_month	Month of arrival date
arrival_date_week_number	Week number of year for arrival date
arrival_date_day_of_month	Day of the month of arrival date

stays_in_weekend_nights	Number of weekend nights (Saturday or Sunday) the guest stayed
stays_in_week_nights	Number of weeknights (Monday to Friday) the guest stayed
adults	Number of adults
children	Number of children
babies	Number of babies
meal	Type of meal booked (e.g., BB for Bed & Breakfast)
country	Country of origin
market_segment	Market segment designation (e.g., Online TA for Travel Agents)
distribution_channel	Booking distribution channel (e.g., TA/TO for Travel Agents/Tour Operators)
is_repeated_guest	Binary variable indicating whether the guest is a repeated guest (1) or not (0)
previous_cancellations	Number of previous bookings that were canceled by the customer
previous_bookings_not_canceled	Number of previous bookings that were not canceled by the customer
reserved_room_type	Code of room type reserved
assigned_room_type	Code of room type assigned
booking_changes	Number of changes made to the booking
deposit_type	Type of deposit made (e.g., No Deposit)
agent	ID of the travel agency that made the booking
company	ID of the company/entity that made the booking or responsible for paying
days_in_waiting_list	Number of days the booking was on the waiting list
customer_type	Type of booking (e.g., Transient)
adr	Average Daily Rate, calculated by dividing the sum of all lodging transactions by the total number of staying nights
required_car_parking_spaces	Number of car parking spaces required by the guest
total_of_special_requests	Number of special requests made by the guest
reservation_status	Reservation last status (e.g., Check-Out)
reservation_status_date	Date when the last status was set

To implement the whole project, you need to perform the following steps:

Part 1:

- Data preprocessing and cleaning
- Booking pattern analysis
- Booking cancellation analysis

- Customer behavioral segmentation
- Write individual interpretation for each task.

Part 2:

- Revenue management
- Operational efficiency
- Loyalty Programs and Repeat Business
- Write individual interpretation for each task.

Part 3:

- Customer Satisfaction
- Marketing and Sales Optimization
- Write individual interpretation for each task.
- Summarize all interpretations obtained from part 1, 2 and 3.
- Provide final business conclusions to support your analysis for the entire project.
- Prepare a PowerPoint presentation with project requirements, findings from analysis, summary, and business conclusions (Use a maximum of 15 slides).

Part 1

The objective of this part is to clean the dataset, analyze data regarding booking patterns, cancellations, customer behavioral segmentation, and then summarize the key findings.

Help Adam to analyze hotel booking data by performing the upcoming tasks.

Task 1: Data Cleaning

- Perform the necessary data cleaning steps to convert messy, unclean data into clean data.

Task 2: Booking Pattern Analysis

- What are the peak booking periods for the hotel?
- Is there a relationship between lead time and the likelihood of a booking being cancelled?
- How do booking patterns vary by month, week, and day of the week?

Task 3: Booking Cancellation Analysis

- What factors influence booking cancellations?
- Are there specific trends or patterns in cancellations over time?
- Can we identify high-risk bookings that are more likely to be cancelled?

Task 4: Customer Behavioral Segmentation

- Are there distinct patterns in the lead time, special requests, or room preferences for different customer segments?

- Which marketing channels are most effective for reaching specific customer segments?
- How can marketing strategies be customized to resonate with specific customer segments, considering factors such as previous cancellations, booking lead time, and special requests?

Part 2

Continuing with the hotel data analysis focusing on booking patterns, booking cancellation analysis, and customer behavioral segmentation, this sprint aims to analyze the data from the perspective of revenue management, operational efficiency, loyalty programs, and repeat business. Subsequently, summarize the key findings obtained from this analysis.

In Part 1 of the project, we analyzed hotel data focusing on booking patterns, booking cancellation analysis, and customer behavioral segmentation. Now, let's address the next set of business questions aimed at identifying key factors for evaluating revenue management, operational efficiency, loyalty programs, and repeat business. In this sprint, utilize the same cleaned dataset obtained in Part 1 of the project.

Write interpretations based on the output generated for each task in this project.

Task 1: Revenue Management

- How does the Average Daily Rate (ADR) vary over time?
- Can we identify pricing strategies that maximize revenue?
- Are there specific room types associated with higher ADR?

Task 2: Operational Efficiency

- What is the effectiveness of different booking distribution channels?
- How do booking changes impact hotel operations?
- Is there a correlation between the duration a booking remains on the waiting list and the likelihood of cancellation?

Task 3: Loyalty Programs and Repeat Business

- What is the behavior of repeated guests with respect to their nature of stay?
- How does the success of loyalty programs relate to the accommodation of special requests from customers?
- What factors contribute to repeat business? Also, what is the distribution of lead time for repeated and non-repeated guests?

Part 3

Continuing with the analysis of hotel data encompassing booking patterns, booking cancellation rates, customer behavioral segmentation, revenue management, operational efficiency, loyalty programs, and repeat business, the focus of this sprint is to delve into customer satisfaction, marketing strategies, and sales optimization. Then, summarize your key findings and provide final business conclusions.

In Project Part 1, we analyzed hotel data focusing on booking patterns, booking cancellation rates, and customer behavioral segmentation. In Project Part 2, we delved into revenue management, operational efficiency, loyalty programs, and repeat business. Now, we aim to address additional business inquiries regarding customer satisfaction, marketing strategies, and sales optimization. This sprint utilizes the same cleaned dataset from Project Part 1.

Write interpretations from the output produced for each task in this project. Summarize all interpretations at the end of the tasks and present final business conclusions.

Task 1: Customer Satisfaction

- What is the distribution of the number and types of special requests made by guests?
- Is there any relation between special requests made by customers and the average daily rate? Additionally, explore customer preferences and expectations for different room types.

Task 2: Marketing and Sales Optimization

- Which marketing channels and market segments contribute the most to successful bookings?
- Which amenities or services have the highest impact on the average daily rate (ADR)?
- What is the distribution of bookings across various distribution channels?

Task 3: Conclusion

- Summarize all interpretations obtained from all the tasks provided in Sprints 6, 7, and 8.
- Provide final business conclusions to support your analysis for the entire project.
- Submit only one single Solution Notebook collating all 3 parts' codes and following mentioned PPT.
- Prepare a presentation ppt with project requirements, findings from analysis, summary, and business conclusion (Use a maximum of 15 slides).