Analyzing Guest Behavior and Cancellations in Hotels: Insights to Optimize Performance

Problem Statement

- The analysis aims to find out the behavior, preference, and pattern of hotel guests in order to optimize operations, reduce cancellations, and increase revenue.

- We identify the best-performing country, in terms of guest bookings, and present its key drivers - stay duration, preferences, and trends.

- By fully understanding what makes the best-performing country the biggest market, we are able tooffer concrete ways for other countries to achieve similar performance and attract more bookings.

Dataset Description

•The dataset contains guest booking data for two hotel types: City Hotel and Resort Hotel.

Key Variables:
•- Hotel Type (City/Resort)
•- Arrival Month
•- Guest Country
•- Total Nights Stayed
•- Meal Preferences
•- ADR (Average Daily Rate)
•- Market Segment
•- Special Requests
•- Is Canceled (Target Variable)
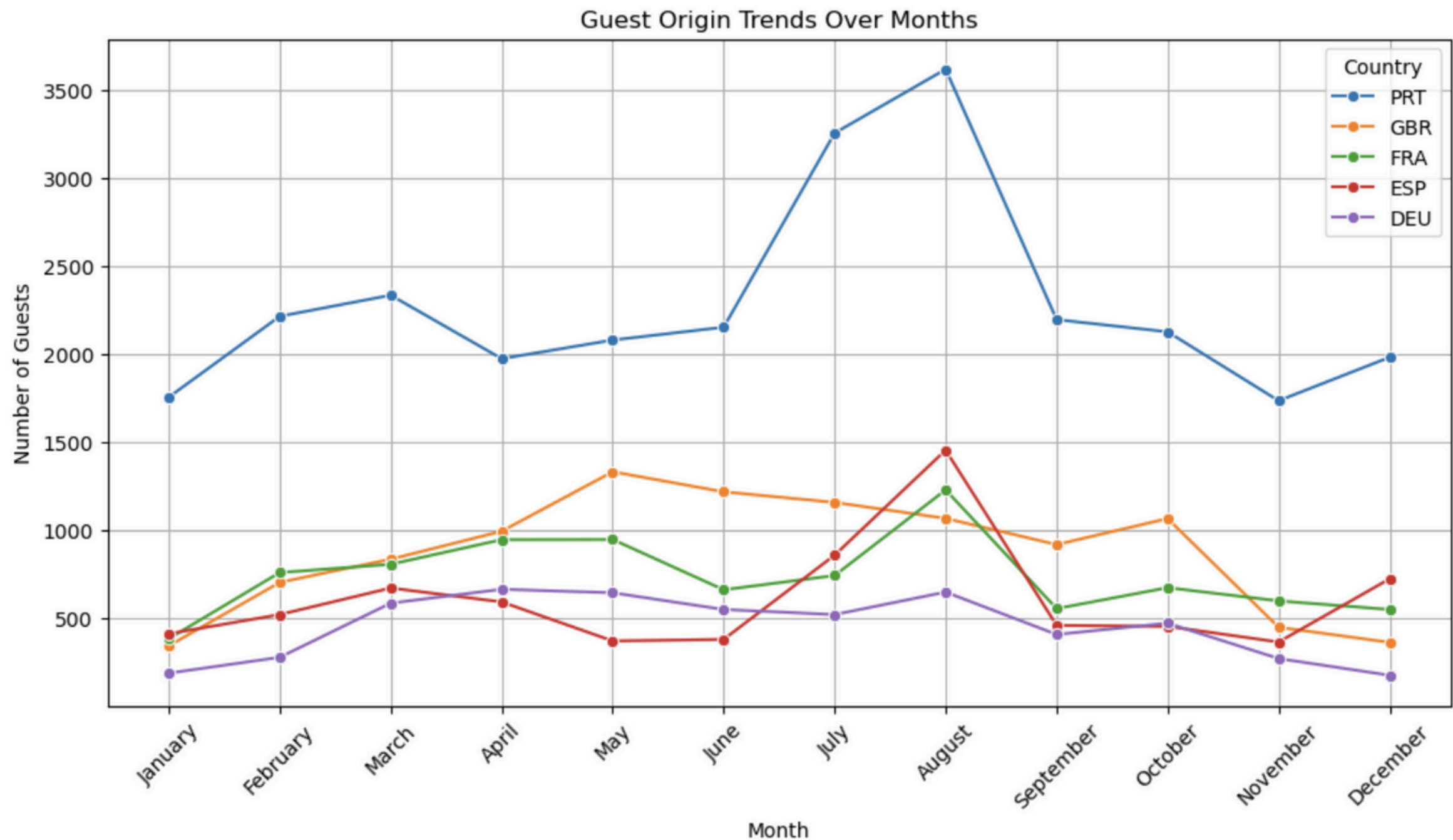
Top 10 Countries of Guest Origin
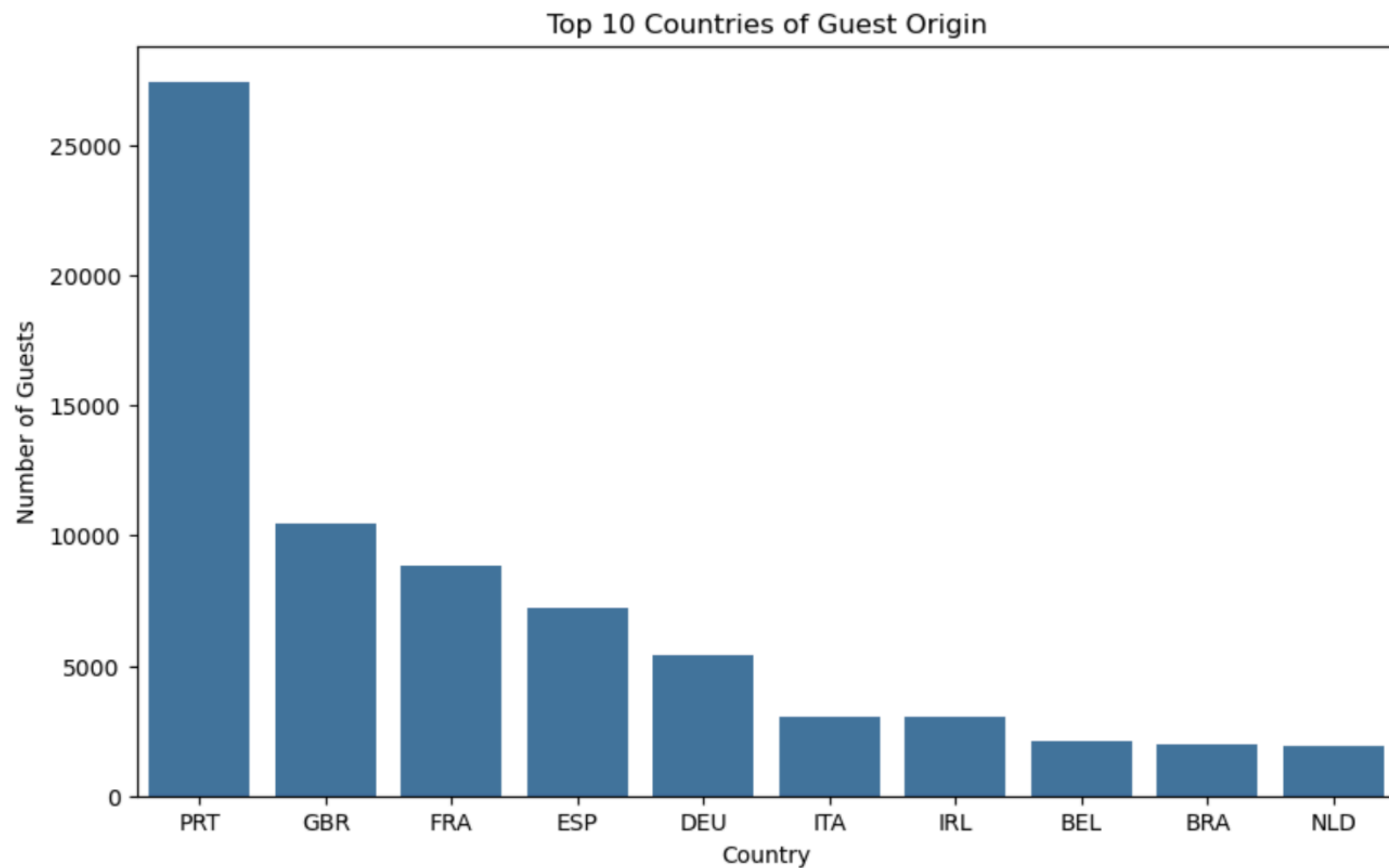
Top 5 Guest Origins:
1. Portugal (PRT) – Largest share of bookings
2. United Kingdom (GBR)
3. France (FRA)
4. Spain (ESP)
5. Germany (DEU)

Observation:
The majority of bookings are from guests with origins in Portugal, indicating a strong concentration of customers from this region.

Guest Origin Trends Over Months

**Guest Origin Trends Over Months(Special Analysis)**

Observations:
1. Except for the United Kingdom (UK), other countries show the highest influx of guests in August and the lowest during December and Januar for all countries listedy.
2. This analysis helps in making suggestions for marketing strategies and pricing optimizations to better align with seasonal demand trends.
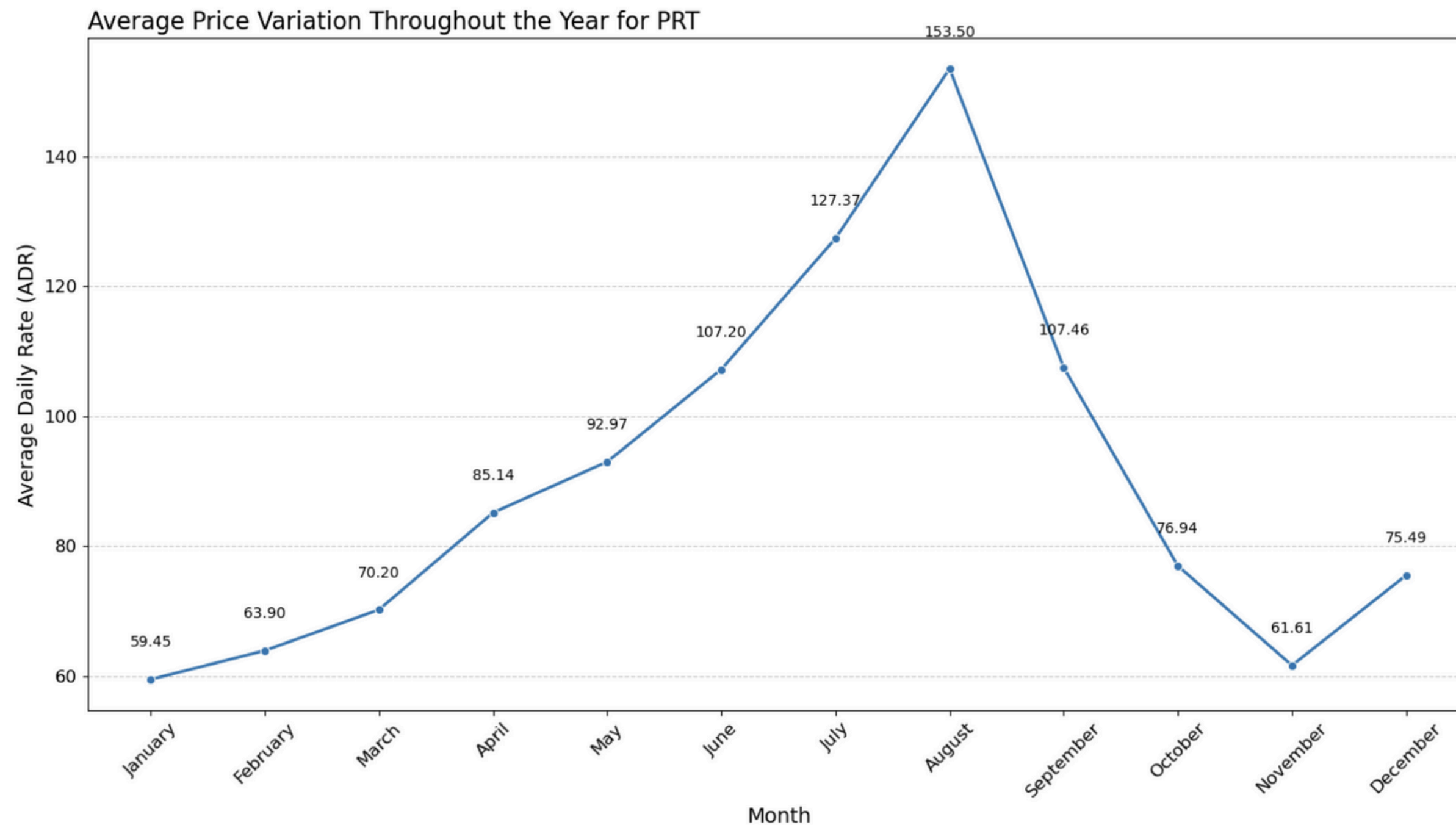
Average Price Variation Throughout the Year

Observations:
1. The highest average daily rate (ADR) is observed in August, followed by July, aligning with the peak summer vacation season.
2. There is a gradual increase in prices from April to August, indicating rising demand as the summer approaches.
3. This analysis suggests that hotels can maximize revenue by adjusting prices during the peak months and introducing discounts or promotions in the off-season to attract guests.ts.

Distribution of Nights Spent by Hotel Type (Portugal)
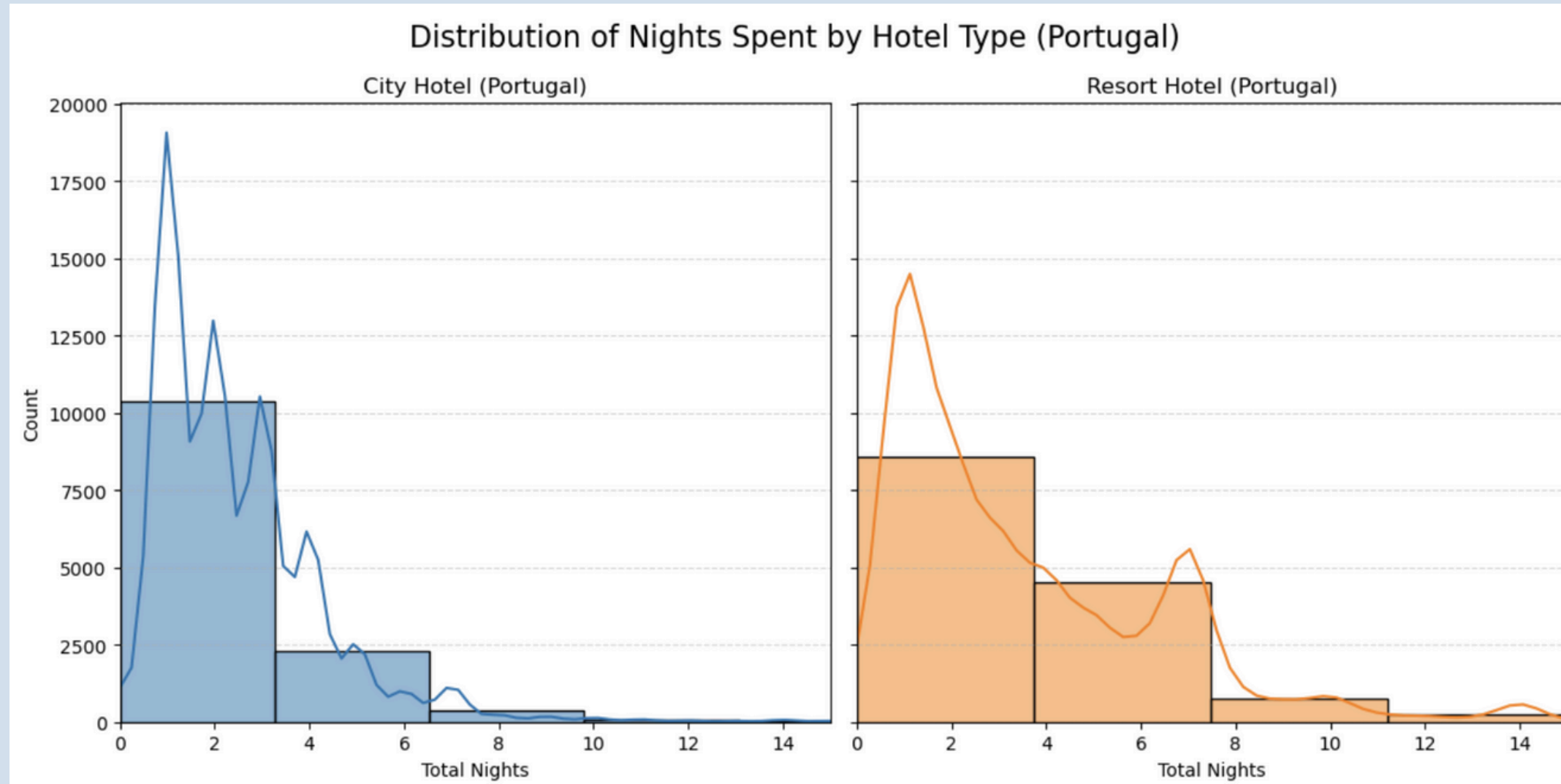
Distribution of Nights Spent by Hotel Type
Resort Hotel:
- Broader Spread: Both short (1-3 nights) and longer stays (4-7 nights) are common.
- Peak Stay: 1 night, but decline is more gradual compared to city hotels.
- Extended Stays: Notable for stays exceeding 7 nights, catering to vacationers.

City Hotel:
- Peak Stay: 1-3 nights, with a sharp drop-off beyond 3 nights.
- Short Stays: Dominated by short-term guests, likely business or city tourists.
- Long Stays: Rarely exceed 7 nights.

Comparison:
- City hotels attract shorter stays; resort hotels accommodate both short and extended stays.
vacationing guests.

Guest Meal Preferences in Portugal
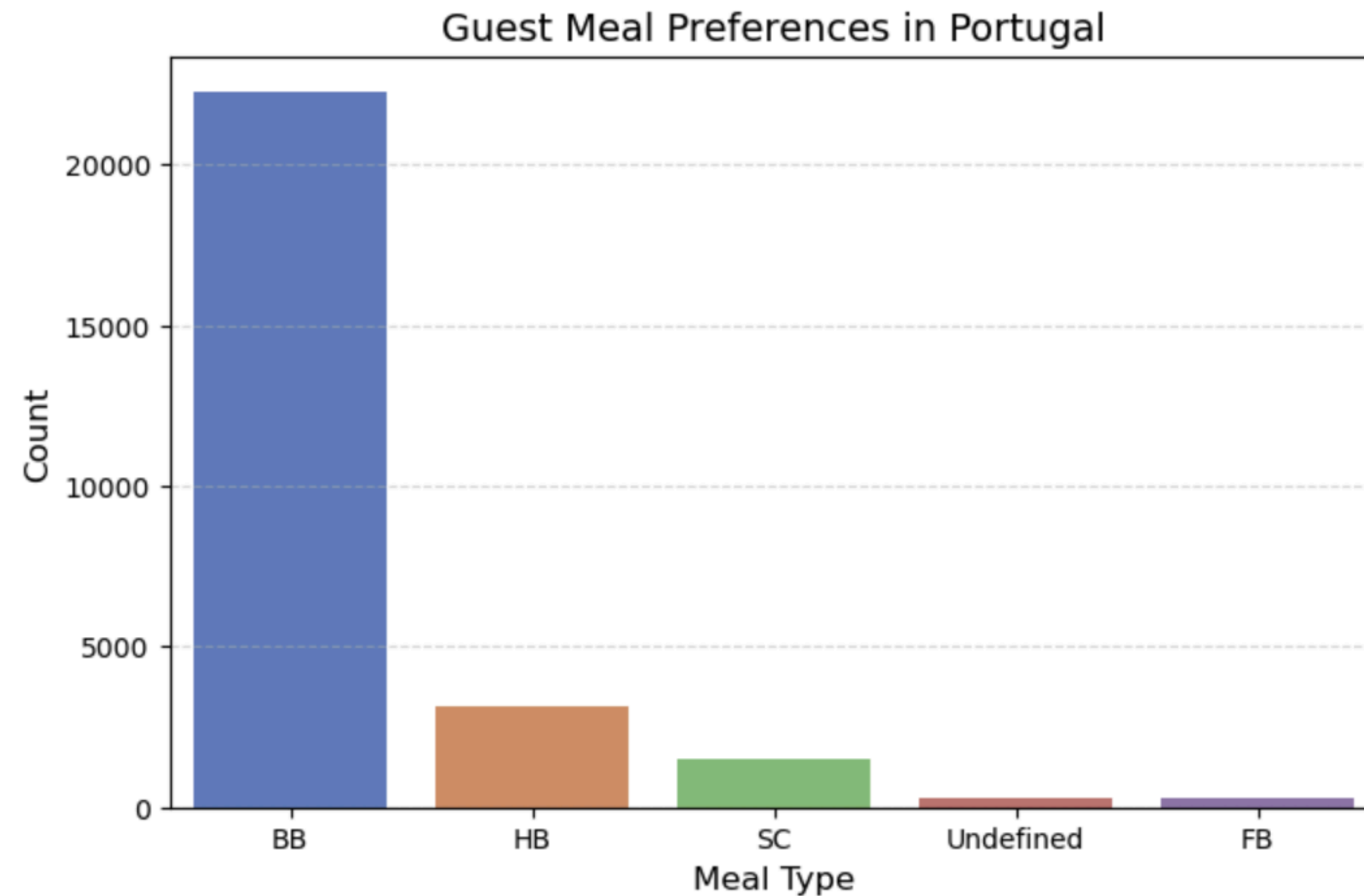
Guest Meal Preferences in Portugal

Observations:
1. The BB (Bed & Breakfast) option is preferred by most of the Portuguese guests, as shown by the highest bar.
2. Introduce interesting BB packages, as Portuguese guests prefer flexible meal arrangements. This will increase bookings and pleasing guests.
.hotels.
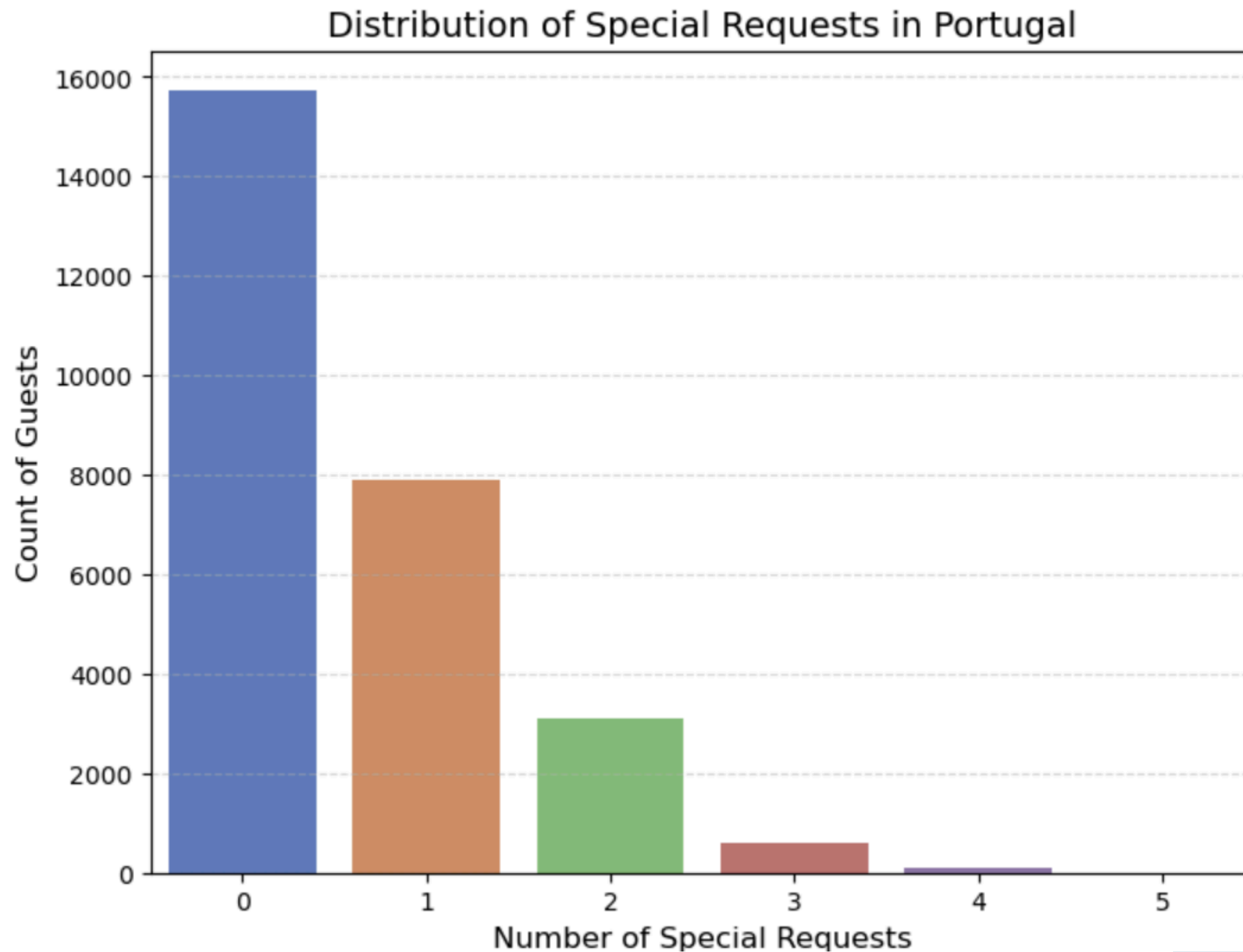
Distribution of Special Requests in Portugal

Observations:
- Dominance of 0 and 1 special request suggests that for most Portuguese guests, very limited customization is required during their stay.

Special Requests Count by Cancellation Status (Portugal)

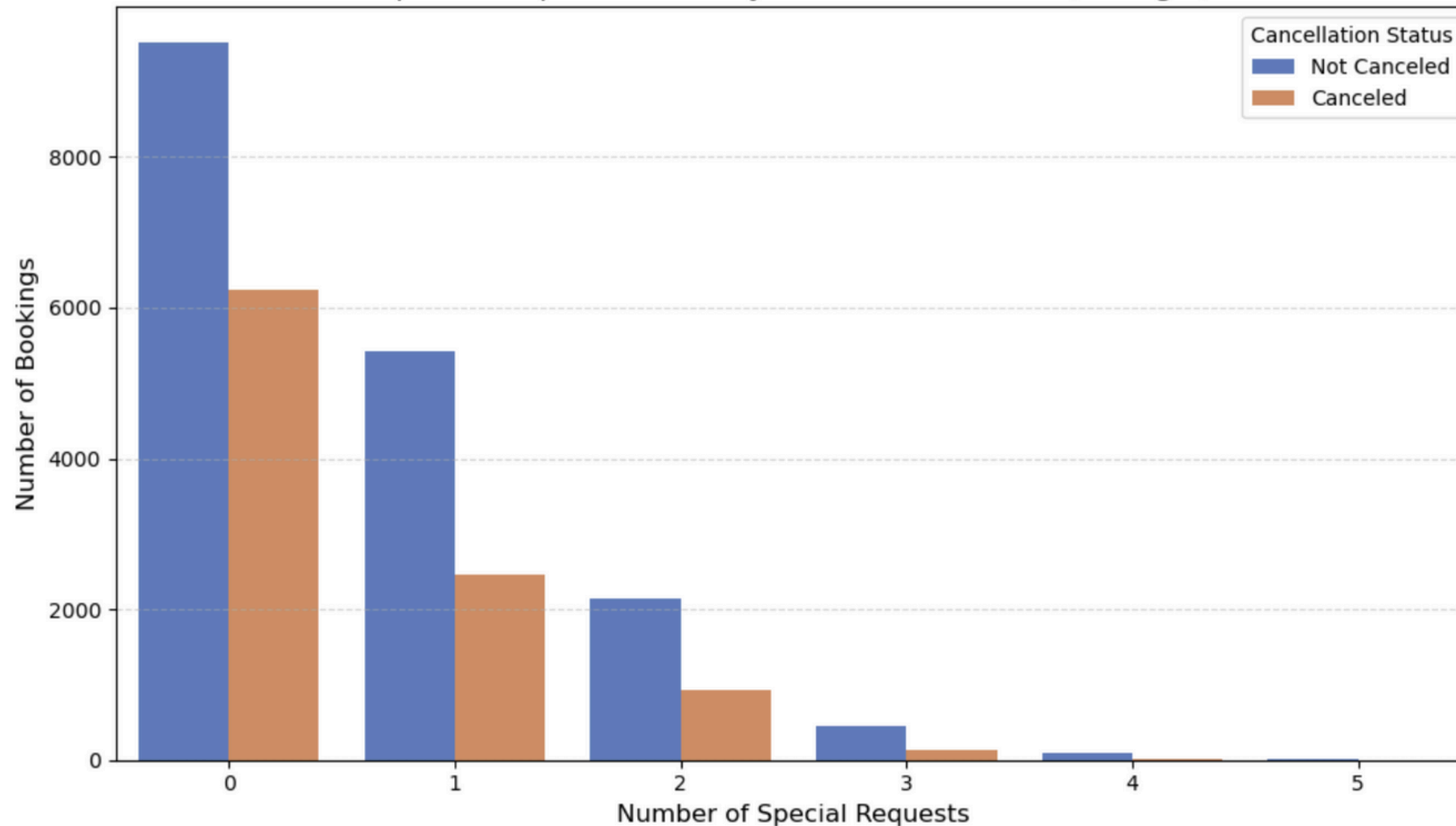**Special Requests vs Cancellation Status (Portugal)**

Observations:
1. The bookings with **0 special requests** are being canceled the most, as depicted by the higher number of canceled bookinment.
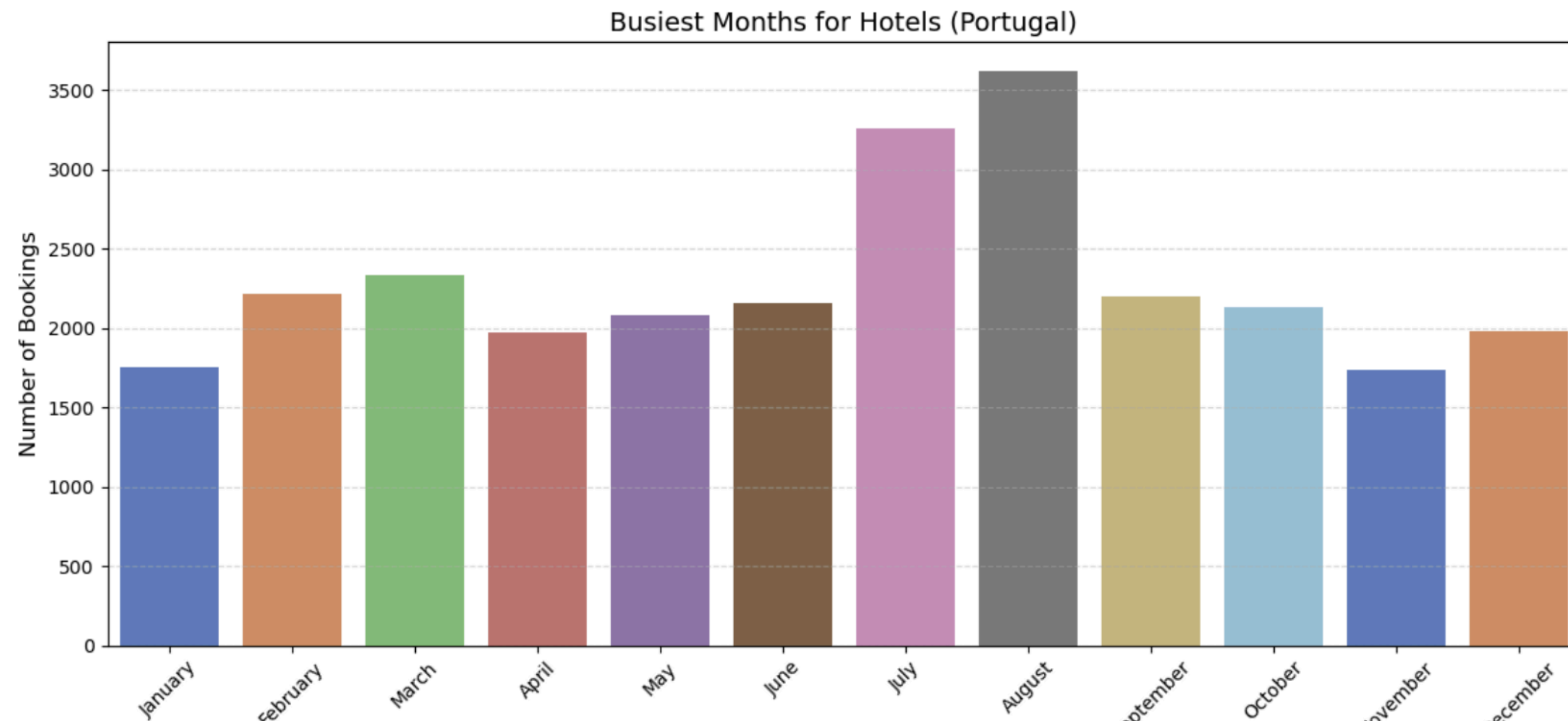
Insights:
- Guests with no special requests may be less committed to their bookings, leading to higher cancellation rates.
- Special requests seem to reflect a higher degree of guest intent and planning.
HOTELS CAN USE THIS ANALYSIS TO **IDENTIFY HIGH-RISK BOOKINGS** (0 special requests) and use various strategies to reduce cancellations, such as offering incentives or confirmations.

Busiest Months for Hotels (Portugal)

Observations:
1. August and July are the busiest months for Portuguese guests, not coincidentally in the summer holiday period.

Insights:
- During summer, **peak demand** is seen in hotels, specifically in the months of **July and August**.
- Marketing efforts and price strategies can be done to take maximum advantage of the peak months of summer.bruary.

Average Stay Duration by Hotel Type (Portugal)

**Average Stay Duration by Hotel Type (Portugal)**
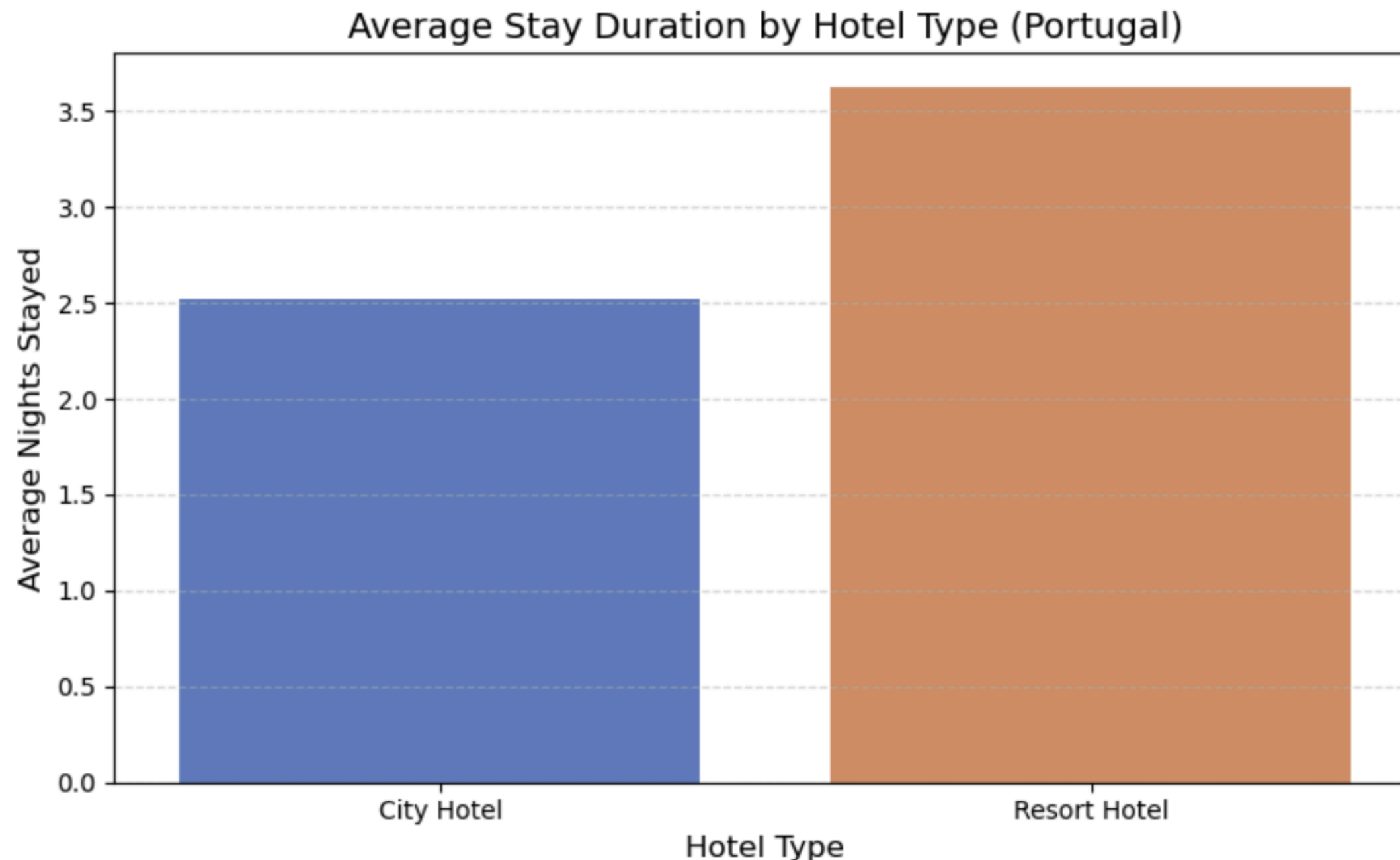
Observations:
1. Guests from Portugal staying in **Resort Hotels** have a much longer average stay duration compared to those staying in **City Hotels**.

Insights:
- **City Hotels** host customers for a shorter period of time, probably for business or quick visits.
- **Resort Hotels** attract customers seeking longer and more leisurely stays.
- The hotels can therefore use this to design their services:
- Promote extended stay packages for Resort Hotels and offer flexible short-stay services for City Hotels.
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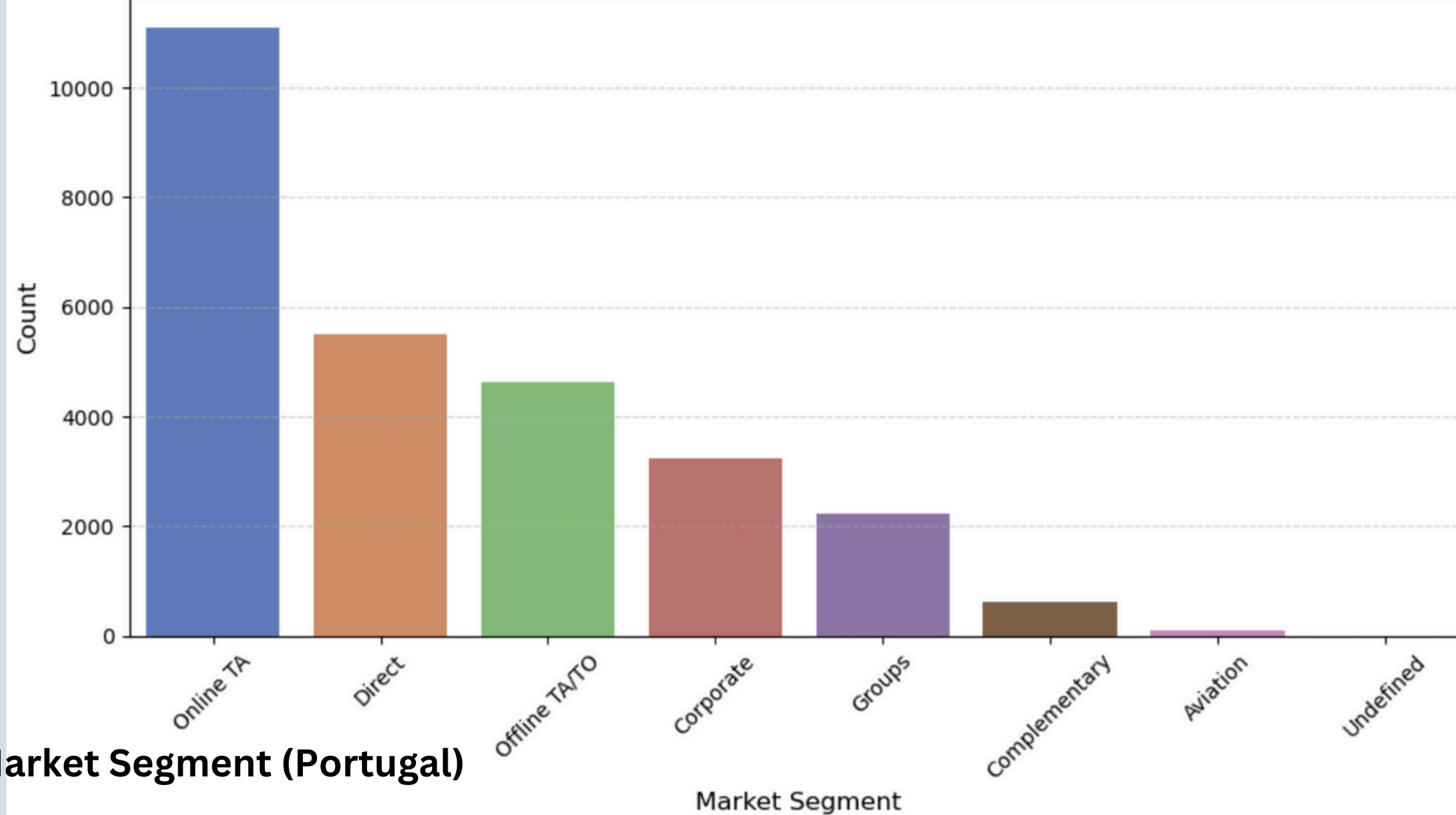
Customer Profiles by Market Segment (Portugal)

Observations:

The strong presence of **Online TA** indicates the preference of Portuguese guests to rely on online channels out of convenience and for the purpose of price comparisons.

Insights :

- More close partnerships with **Online Travel Agencies (OTA)** may strengthen the volume of Portuguese guests.
- The share of direct bookings signals strong customer trust and loyalty. Hotels may give more incentive to customers for direct booking through loyalty programs or discounts.
- Corporate and Group bookings are relatively at a low level, showing an opportunity in attracting this kind of segment through targeted marketing.

Confusion Matrices: Logistic Regression vs Random Forest
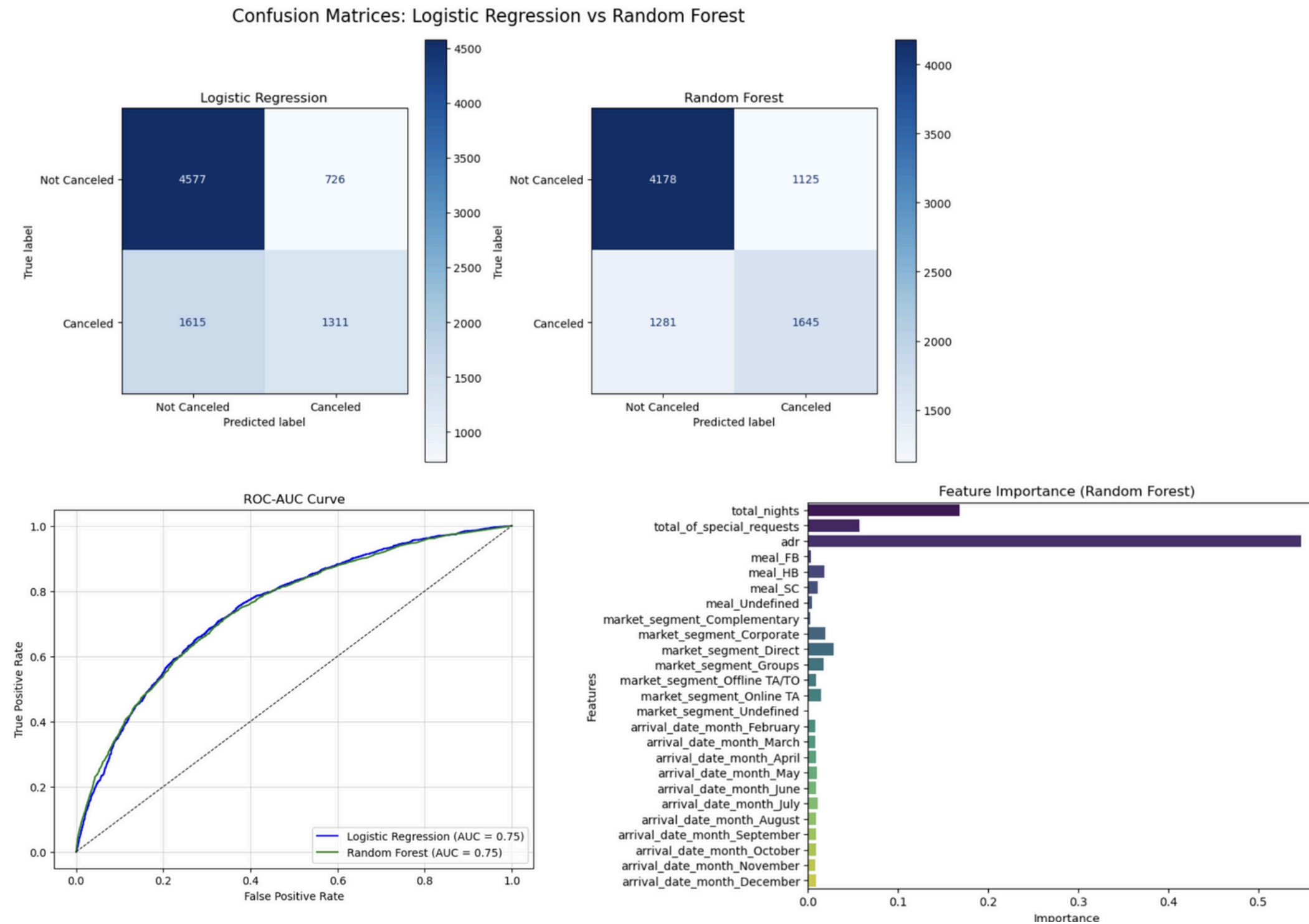
The Logistic Regression model outperforms the Random Forest Classifier, with:
Accuracy: 71.55%
ROC-AUC: 74.84%

- The major challenges, according to the analysis, would be cancellations, which affect the operations and revenues.That is why I've trained Logistic Regression and Random Forest Classifier to predict booking cancellation based on the following list of features:Total Nights Stayed, Special Requests, ADR: Average Daily Rate, Market Segment, Meal Preferences,Arrival Month.

- For both models, I have trained and tested the dataset, evaluated their performance, and further compared metrics such as accuracy and ROC-AUC score for a proper understanding of predictive capabilities.

Key Recommendations

1. Increase guest engagement through special requests to reduce cancellations.
2. Adjust pricing strategies for guests with shorter stays to improve retention.
3. Target high-cancellation market segments (e.g., 0 special requests) with better engagement strategies.
4. Promote longer stays in Resort Hotels during summer months to maximize revenue.

Thank You