Topic: Trend Analysis and Predictive Forecasting for Optimizing Hotel Booking, Staffing, and Inventory Management

Objectives:

1. Analyze historical hotel booking data to identify trends influencing booking patterns.
2. Utilize predictive models to forecast staffing and inventory requirements, ensuring adequate personnel during peak periods while minimizing costs during slower times. Optimize inventory allocation by prioritizing channels with the highest revenue potential. By analyzing historical booking trends, seasonality, local events, and economic factors, adjust room rates dynamically to maximize revenue based on anticipated demand.
3. Determine the likelihood of reservation cancellations and forecast the expected length of stay to adjust cancellation policies, implement overbooking strategies, and optimize room allocation resulting in improved occupancy rates and better guest experience.

Datasets:
Dataset name: Hotel Booking Demand
Link: https://www.kaggle.com/datasets/jessemostipak/hotel-booking-demand?resource=download

Github(TinyTuesday):
https://github.com/rfordatascience/tidytuesday/tree/master/data/2020/2020-02-11

Description:

- Provides information about hotel reservations, covering two distinct types of hotels. The dataset contains records of booking consisting of 119,390 rows for observation and 32 columns for features made between July 2015 and August 2017, allowing for extensive analysis of booking trends, customer behavior, and hotel performance.

Hotel Information:

Hotel (hotel):
Type of hotel where the booking was made, either City Hotel or Resort Hotel.

Booking Details:

Lead Time (lead_time):

- The number of days between the booking date and the check-in date.

Arrival Date (arrival_date_year, arrival_date_month, arrival_date_day_of_month, arrival_date_week_number, arrival_date_day_of_week):

- The date of arrival, including the year, month, day of the month, week number, and day of the week.

Length of Stay (stays_in_weekend_nights, stays_in_week_nights):

- The number of nights booked, split between weekend nights (Friday-Saturday) and weekday nights (Monday-Thursday).

Is Canceled (is_canceled):
- Indicates whether the booking was canceled (1) or not (0).

Booking Changes (booking_changes):
- Number of times the booking was modified (e.g., room type or stay duration).

Customer Information:

Country (country):
- The guest's country of origin, represented by a country code.

Market Segment (market_segment):
- The type of market from which the booking originated, such as Direct, Corporate, Online Travel Agent (OTA), or Groups.

Distribution Channel (distribution_channel):
- The channel used to make the booking (e.g., direct booking, travel agents).

Customer Type (customer_type):
- The type of customer, such as transient (one-time guest), contract, or group.

Repeat Guest (is_repeated_guest):
- Indicates whether the guest has stayed at the hotel before (1 for repeated guests, 0 for first-time guests).

Guest Demographics:

Adults, Children, Babies (adults, children, babies):
- Number of adults, children, and babies included in the booking.

Previous Cancellations (previous_cancellations):
- The number of previous bookings canceled by the guest.

Previous Bookings Not Canceled (previous_bookings_not_canceled):
- Number of previous bookings made by the guest that were not canceled.

Room Information:

Reserved Room Type (reserved_room_type):
- The room type originally reserved by the guest.

Assigned Room Type (assigned_room_type):
- The room type that was ultimately assigned to the guest.

Required Car Parking Spaces (required_car_parking_spaces):
- Number of parking spaces requested by the guest.

Financial and Price Information:

Average Daily Rate (ADR) (adr):
- The average revenue per room, calculated by dividing the total revenue by the number of occupied rooms.

Deposit Type (deposit_type):
- Type of deposit made for the booking (e.g., no deposit, refundable deposit, or non-refundable).

Total Special Requests (total_of_special_requests):

- The number of special requests made by the guest, such as room preferences or additional services.

Special Services:

Meal Package (meal):

- Type of meal plan included with the booking, such as BB (Bed & Breakfast), HB (Half Board), or FB (Full Board).

Company (company) and Agent (agent):

- Codes representing the travel agency or company that facilitated the booking, if applicable.
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Cancellation and No-shows:

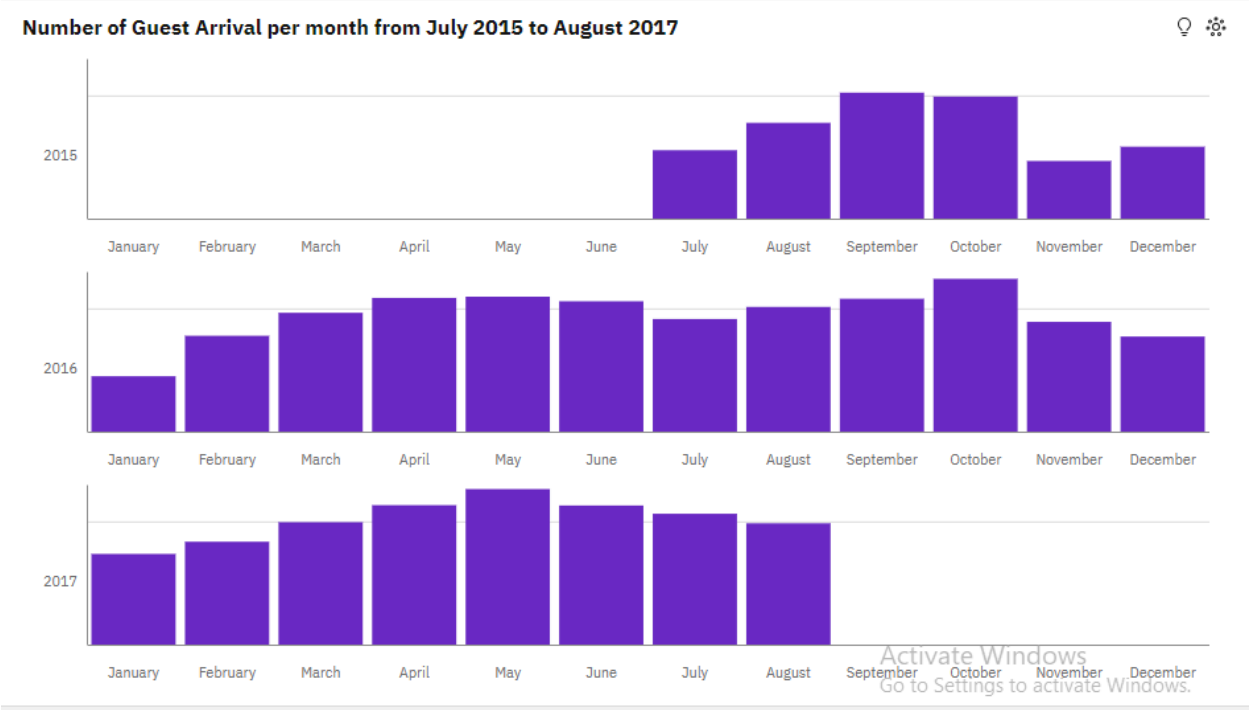
Reservation Status (reservation_status):

- Current status of the reservation: Canceled, Check-Out, or No-Show.

Reservation Status Date (reservation_status_date):

- The date on which the last status change was made to the reservation.

Objective 1:

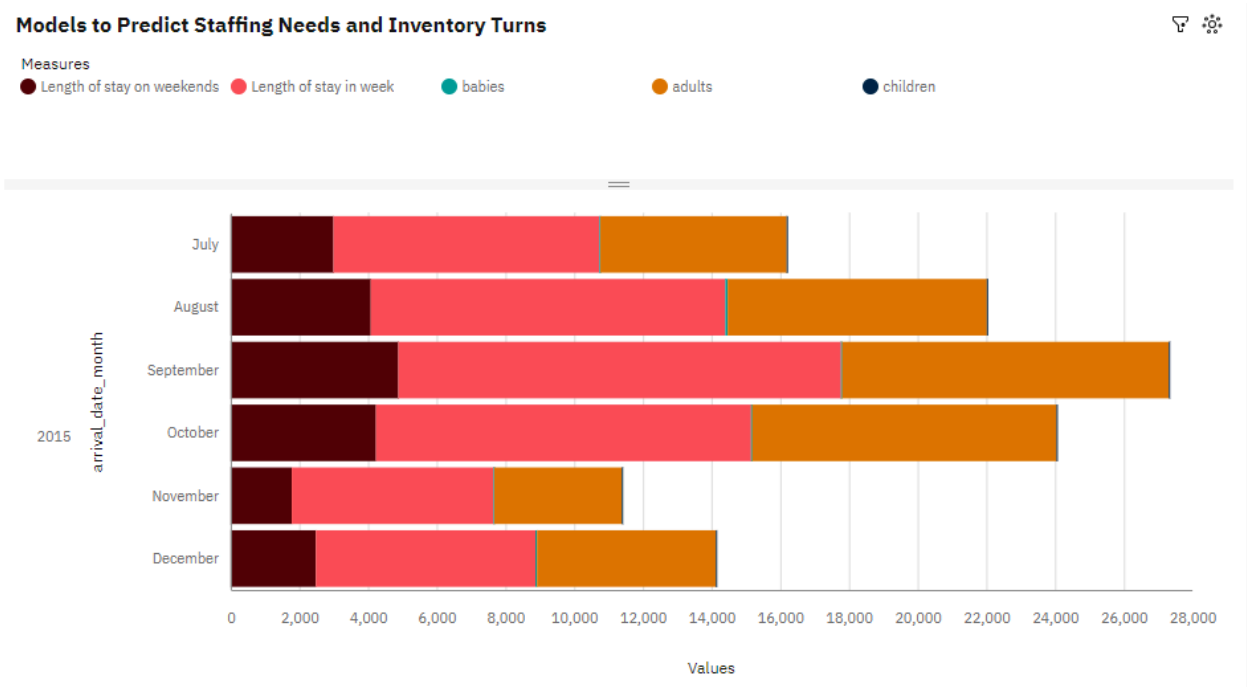


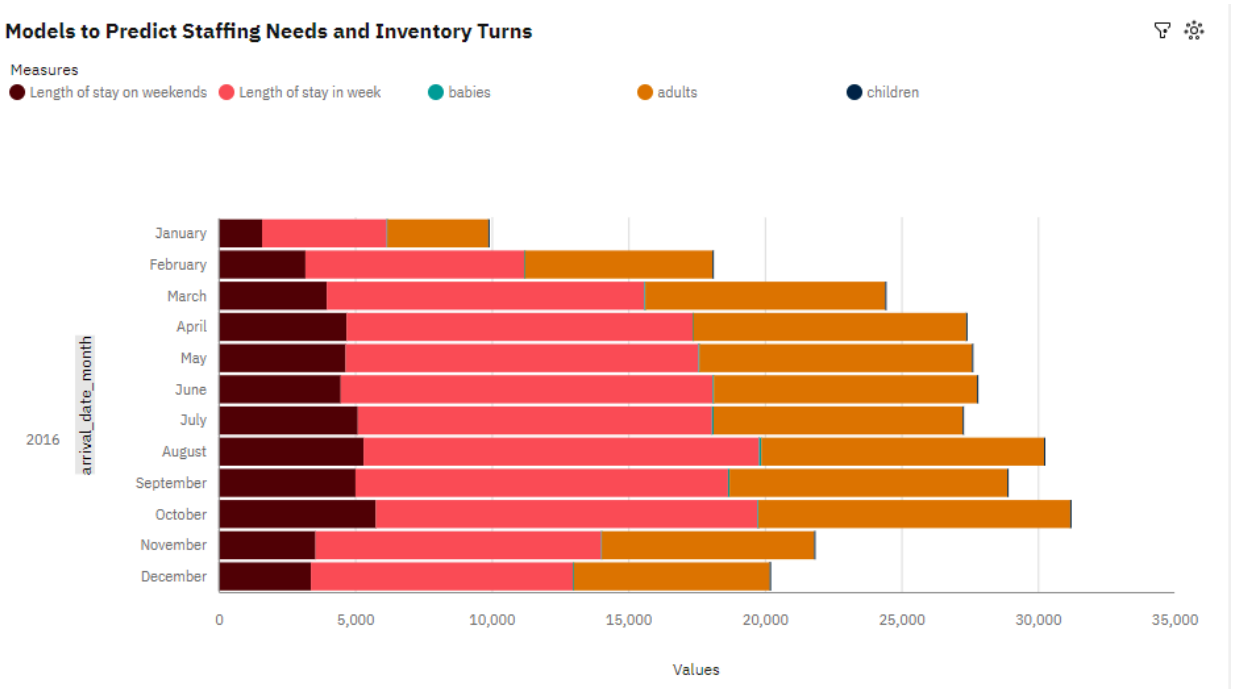
Visualization: Column Graph

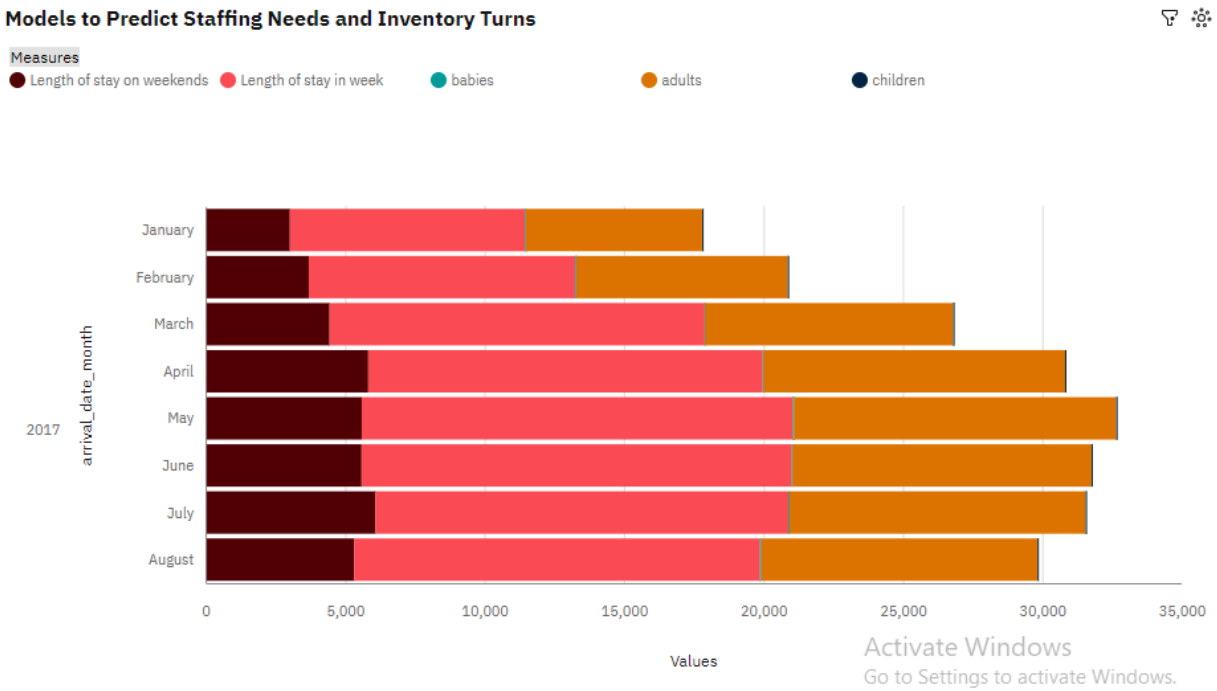
Columns Used: arrival_date_month (bars, length), arrival_date_year (repeat(row))

Visualization: Dual-Line Graph
Columns Used: arrival_date_month (x-axis), hotel (line 1&2 position, line 1&2 color), arrival_date_year(repeat(row))

Objective 2:

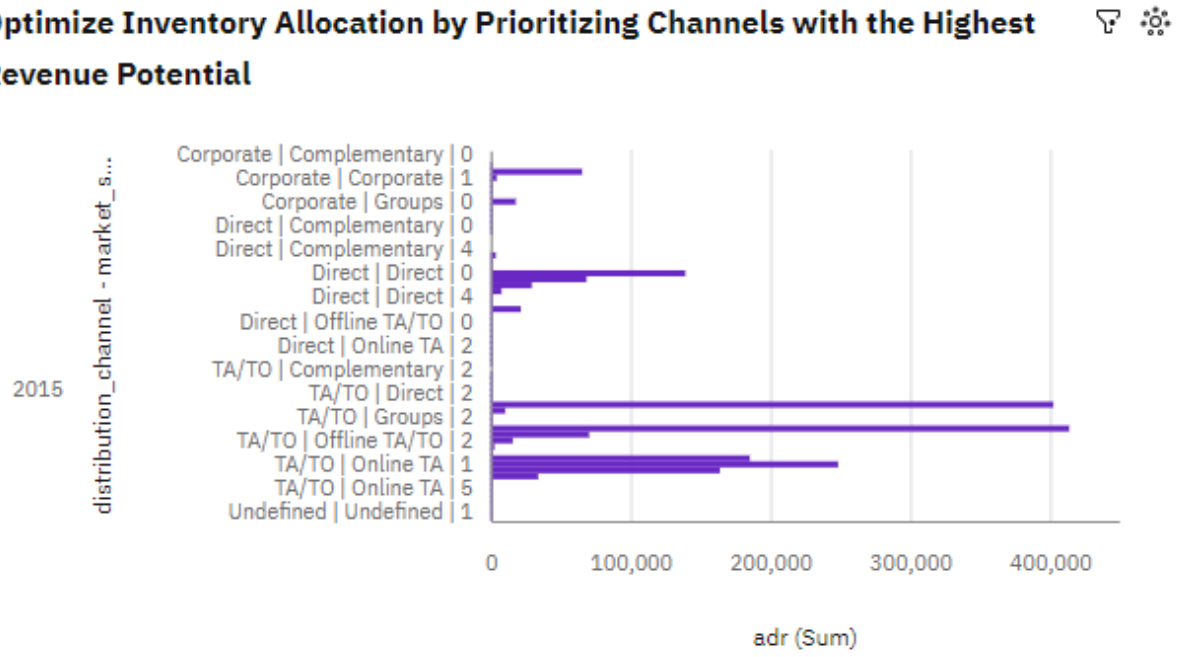




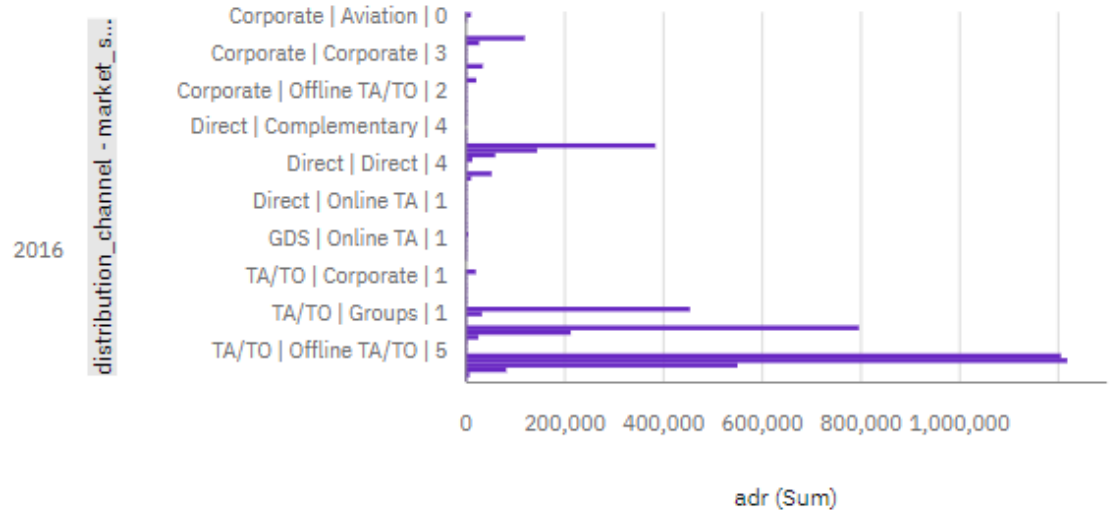


Visualization: Stack Bar Graph
Columns Used: arrival_date_month (bars), stays_in_weekend_nights (length), stays_in_week_nights (length), adults (length), children (length), babies (length), arrival_date_year (repeat(row))

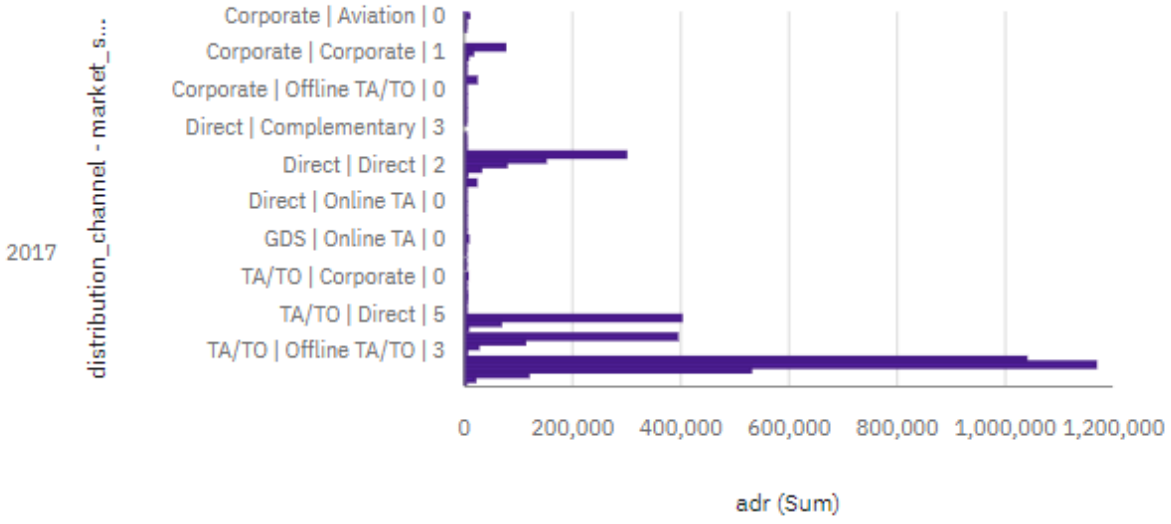
Objective 3:


Optimize Inventory Allocation by Prioritizing Channels with the Highest Revenue Potential
2015
distribution_channel - market_s...
Corporate | Complementary | 0
Corporate | Corporate | 1
Corporate | Groups | 0
Direct | Complementary | 0
Direct | Complementary | 4
Direct | Direct | 0
Direct | Direct | 4
Direct | Offline TA/TO | 0
Direct | Online TA | 2
TA/TO | Complementary | 2
TA/TO | Direct | 2
TA/TO | Groups | 2
TA/TO | Offline TA/TO | 2
TA/TO | Online TA | 1
TA/TO | Online TA | 5
Undefined | Undefined | 1
0
100,000
200,000
300,000
400,000
adr (Sum)

Optimize Inventory Allocation by Prioritizing Channels with the Highest Revenue Potential

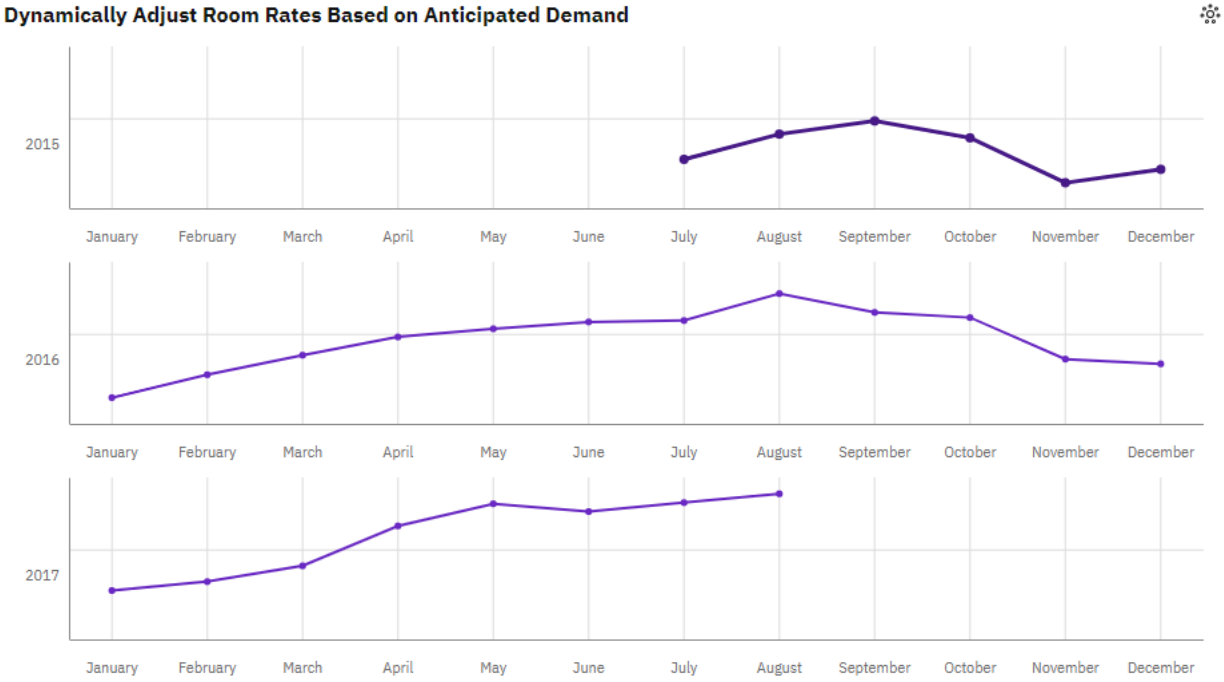


Optimize Inventory Allocation by Prioritizing Channels with the Highest Revenue Potential



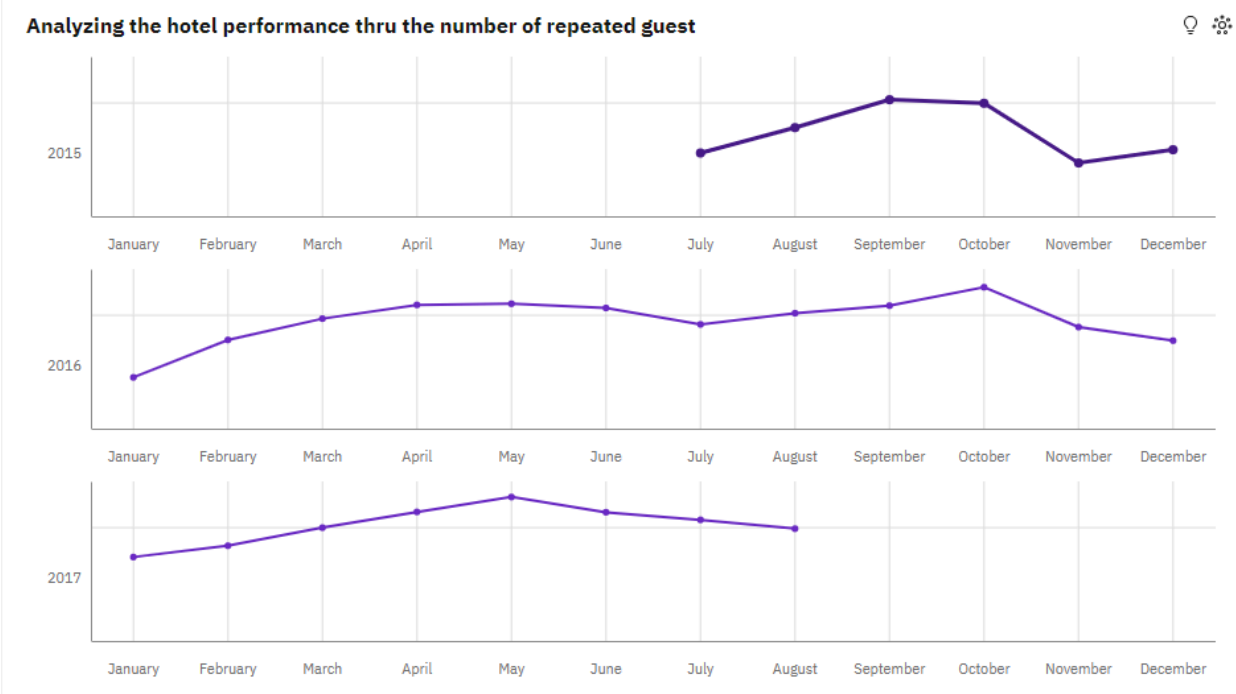
Visualization: Bar Graph
Columns Used: distribution_channel (bars), market_segment(bars), total_of_special_requests(bars), adr(length), arrival_date_year(repeat(row))

Objective 4:



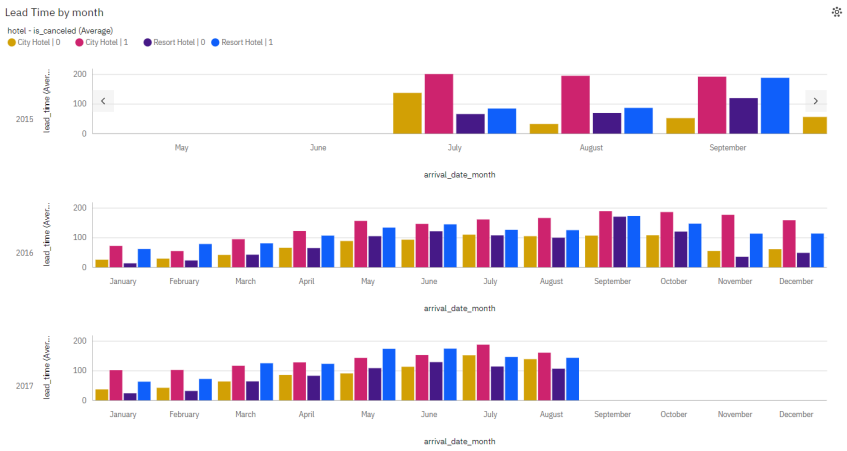
Visualization: Line Graph
Columns Used: arrival_date_month (x-axis), adr (y-axis), arrival_date_year(repeat(row))

objective 6:



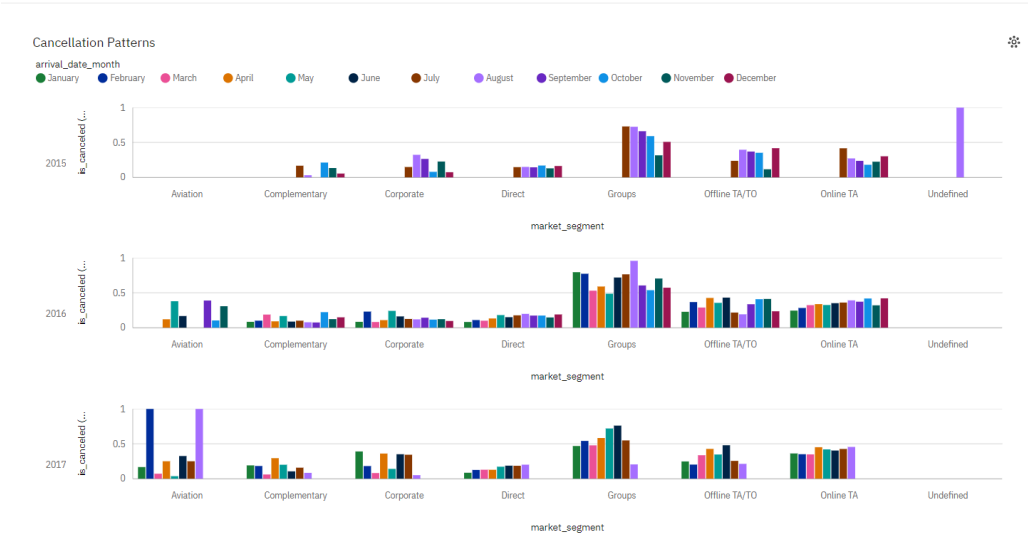
Visualization: Line Graph

Columns Used: arrival_date_month(x-axis), is_repeated_guest(y-axis), arrival_date_year(repeat(row))



Lead Time by Month

- Columns combined: Lead time (length), arrival_date_month(bars), hotel(color), is_canceled(color) and arrival_date_year(repeat row).
- Visualization used: Bar Graph



Cancellation Patterns

- Columns combined: Market segment(bars), arrival_date_month(color), and is_canceled (length), arrival_date_year(repeat row).
- Visualization used: Bar Graph