The 4th Annual Business Analytics Competition 2024
Round 2: Predictive Analytics

In a competitive business world, companies are seeking students with both technical insight and business acumen to lead the charge to the future. To help students prepare for this competitive marketplace, the Saunders College of Business presents the 4th Annual Business Analytics Competition 2024 that aims to bring together students from diverse backgrounds and skill levels to solve complex and meaningful business problems.

This "Challenge and Tasks" document is for the **second round** of the 2024 Business Analytics Competition. Participation in the first round of the competition is **NOT** necessary or mandatory for the second round. Students are encouraged to review the "Reflections from Judges" for round 1 to better position themselves for round 2.

Scenario

Global Hotels and Resorts (GHR) is a top European hotel brand that recently acquired a hotel in Lisbon, Portugal. Their immediate focus is to maximize the potential revenue of the hotel. To this end, GHR has hired your team to help them address this problem. Insights from another consulting team has led GHR to conclude that the hotel revenue is best to calculated using the formula:

$$Potential\ Revenue = Revenue\ gain\ from\ hotel\ stays - Revenue\ loss\ from\ free\ upgrades - Revenue\ loss\ from\ last\ minute\ cancellations$$

In which:

- Revenue gained from hotel stays is primarily calculated by multiplying the length of the stay with the average daily rate (ADR). The ADR is dynamically determined based on various factors such as booking channels, amenities included in the reservation, customer type, room types, etc.
- Revenue loss from free upgrades happens when a customer is upgraded to a higher room type than the originally reserved room type. The greater the upgrade, the higher the revenue loss. For instance, if a customer reserved room type A (luxury room type) but is assigned room type G (executive room type), it results in a revenue loss, treated as an opportunity cost. Currently, GHR lacks an exact cost calculation for free upgrades.

- Revenue loss from last-minute cancellations occurs when a customer cancels within three days of their arrival date, often leaving insufficient time for the hotel to find another customer (an opportunity cost). So, the longer the length of stay the greater the cost. The current penalty for last-minute cancellations is the cost of a one-night stay.

Based on the formula, GHR has hired your team to help them maximize the potential revenue of the hotel. Specifically, its Revenue Management department wants your team to perform the following tasks:

1. Discuss the impacts of upgrades on revenue and build a predictive model for upgrades, which will help GHR better manage its upgrade policy, thereby improving its revenue
2. Compare guests with last-minute (within 3 days) versus earlier cancellations to better optimize the cancellation policy, ultimately enhancing revenue.
3. Study strategies to maximize potential revenue gained from hotel stays, exploring areas such as refining ADR, improving room occupancy, and identifying optimal amenities to attract customers or lengthen their stays.

Data

GHR has provided a file ("R2-final-hotel.csv") that contains the booking information for guests in the GHR hotel from 2015 to 2017. The data dictionary is below. In addition, GHR also provides the following information:

- The hotel has a total of 331 rooms in which:
  - 237 are deluxe rooms (mix of room type A, B, C, D)
  - 94 are executive rooms and suites (mix of room type E, F, G). Close to 80% of these rooms are executive rooms.
- The hotel also knows that many customers come to visit Lisbon when there are popular festivals in the city. There are many lists of those festivals. One example is this list of 2017 festivals. (Students are encouraged to search for other lists.)

Table 1: Data dictionary

Variable	**Type**	**Description**
ArrivalDate	Date	Arrival Date of the Guests in the Reservation
ArrivalWeekNumber	Numeric	Week Number of the Arrival Date (1 to 53)
AssignedRoom	Categorical	Assigned Room Type Code. Can be different from Reserved Room Type due to hotel operation reasons (e.g. overbooking) or by customer request (based on availability).
AverageDailyRate	Numeric	Room's Average Daily Rate for the customer's reservation
BookingChanges	Numeric	Booking Amendments Count (From Entry to Check-In or Cancellation)

BookingCompany	Categorical	Booking Company/Entity ID (For Anonymity)
BookingDistributionChannel	Categorical	Booking Distribution Channel (TA for Travel Agents, TO for Tour Operators)
BookingMeal	Categorical	Booked Meal Type. - Undefined/SC for no meal package - BB for Bed & Breakfast - HB for Half Board (breakfast and one other meal – usually dinner) - FB for Full Board (breakfast, lunch and dinner))
BookingParking	Numeric	Number of Required Car Parking Spaces
Country	Categorical	Guests' Country of Origin (ISO 3155–3:2013 Format)
CustomerType	Categorical	Booking Type. Four categories: - Contract - when the booking has an allotment or other type of contract associated to it; - Group – when the booking is associated to a group; - Transient – when the booking is not part of a group or contract, and is not associated to other transient booking; - Transient-party – when the booking is transient, but is associated to at least other transient booking
DaysInWaitingList	Numeric	Waiting List Duration before Confirmation
DepositType	Categorical	Deposit Made for Booking. Three categories: - No Deposit – no deposit was made; - Non Refund – a deposit was made in the value of the total stay cost; - Refundable – a deposit was made with a value under the total cost of stay.
LeadTime	Numeric	Days Between Booking Entry Date and Arrival Date
MarketSegment	Categorical	Market Segment Designation (TA for Travel Agents, TO for Tour Operators)
NumberOfAdult	Numeric	Number of Adult Guests in the Booking
NumberOfBabies	Numeric	Number of Infants (Under 12 Months) in the Booking
NumberOfChildren	Numeric	Number of Children (Aged 1 to 17) in the Booking
PreviousBookingNotCanceled	Numeric	Number of previous bookings NOT canceled by the customer prior to the current booking
PreviousCancellations	Numeric	Number of previous bookings that were canceled by the customer prior to the current booking
RepeatedGuest	Categorical	Repeated Guest Indicator (1 for Repeated, 0 for New)

ReservationStatus	Categorical	The Guest's Last Status in the System. Three categories: - Canceled: reservation was canceled by the customer - Check-Out: customer has checked in and already departed - No-Show: customer did not check-in and did inform the hotel of the reason why
ReservationStatusDate	Date	The Date when the Guest's Status is Last Updated in the System. It can be used with the ReservationStatus to understand when the reservation was canceled or when the customer checked-out of the hotel
ReservedRoom	Categorical	Reserved Room Type Code (for Anonymity)
StaysInWeekendNights	Numeric	Number of Weekend Nights
StaysInWeekNights	Numeric	Number of Week Nights
TotalOfSpecialRequests	Numeric	Special Requests Count (e.g., Twin Bed, High Floor)
TravelAgent	Categorical	Booking Travel Agency ID

Objectives

1. The purpose of this challenge is to derive **strategies that improve the revenue** of GHR's hotel. Hence, good business understanding is important for this challenge. Teams are encouraged to include members with both technical and business skills.
2. Teams should use a mix of both descriptive and predictive analytics, among others, to address the challenge.
3. In this part of the competition, the focus will be on **data-driven strategies**. Teams are challenged to clearly justify their choices and demonstrate the rigorousness of the analyses, convincingly draw the conclusions and suggest meaningful strategies related to the challenge outlined by GHR.

Deliverables

Business Report

Your team is asked to produce a business report (no more than 10 pages, normal margin, 11 point font) that communicates your findings to GHR. The report should contain the following elements:

1. A cover page names, email, information about school and major of each team member. The cover page should indicate the team leader of the team (who will receive communication from the judges). This cover page is not counted toward the page limit.
2. An executive summary that presents key findings and recommendations for GHR executives

3. A data preparation section that outlines the handling of data as well as providing details of any additional data used
4. A data analysis section that reports the techniques used by the team
5. A results section that explains the findings and provides interpretations and recommendations for GHR executives.
6. An appendix section that contains any details the team wishes to clarify (e.g., assumptions, additional visualizations, tables). The appendix section is excluded from the page limit.

The above are the common elements that judges look for. Teams are free to organize the report in ways that best reflect their findings.

Technical Works

All accompanying analysis files **should be submitted** together with the report (e.g., Tableau files, R/Python codes, Excel files, etc.). This allows the judges to independently verify the integrity of the results if needed.

- The files should be in working order for the judges to duplicate the results. Failure to do so will result in deduction of your points.

Procedure to Participate

1. Interested students should gain access to the datasets and challenge in the competition website (https://www.rit.edu/business/business-analytics-competition).
    a. Students should form their own teams. Each team should have no more than **five members**.
    b. Students who wish to find a teammate can email their self-introduction and what they looking for to btp@saunders.rit.edu
2. There will be a workshop on **Feb 16 @ 12pm EDT, 2024** in which students will have the opportunity to ask questions and discuss their preliminary findings with some mentors. This is a hybrid event with both in-person and Zoom options. Those who want to attend the workshop need to sign up using the link on the competition website.
3. Participating teams can submit their final solution on the competition website. The deadline for submission is **March 8, 2024 at 11:59pm EDT.** Late submissions will not be considered.
4. The evaluation of students' submissions will be done and announced by **March 18, 2024**. This will be a hybrid event with both in-person and Zoom options. A set of finalists will be invited to the next event.
5. The finalists will be invited to deliver their presentations on **March 29 @ 10am EDT, 2023**. Each team will be given 15-20 minutes to present their findings to a panel of industry practitioners. The panel will select the top three teams as the prize winners for this competition. Other honorable mentions will also be announced.

Evaluation Criteria

A panel of instructors will assess the quality of each submission on the following dimensions:

1. **Technical accuracy and sophistication** - Does the report build confidence in the technical analyses? Does the team show creativity in constructing visualizations and analyses? Are they appealing?
2. **Business logic and implied reasoning** - Do the findings demonstrate an understanding of how the data contributes to the business decisions?
3. **Report coherency, narrative flow, and professionalism** - Does the report clearly communicate both the technical and business thinking to persuade an audience of business executives?