Data Science Report

Big Mountain Resort's Ticket Price and Potential Facility Improvements

Problem Statement

What opportunities exist for Big Mountain Resort (BMR) to increase revenue by 15% in the coming year (2021) with respect to last year (2020) by cutting operating costs and/or improving its facilities to support an increased ticket price?

Analysis Goals

The goal of this analysis is two-fold:

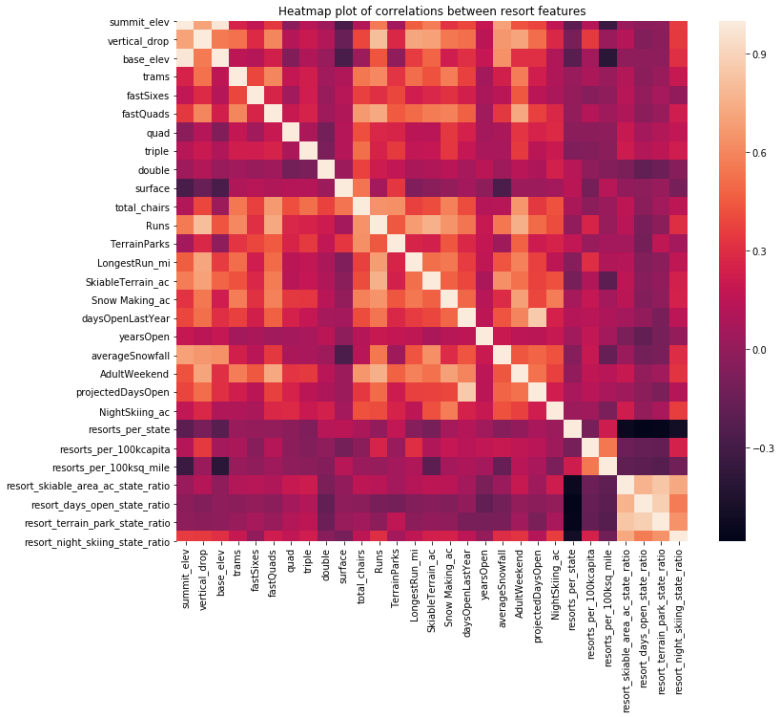
1. Evaluate whether BMR's current ticket price is in line with its market segment[1].
2. Predict how potential future changes in the facilities offered by BMR will impact the supported ticket price.

Key Data Sources

The analysis is based on a single dataset containing values of 27features for 330 resorts throughout the U.S. (including BMR) that share a market segment. Adult Weekend ticket price was selected as the target variable in this analysis. Important note: no data on operating costs was available at the time of this analysis.

Exploratory Data Analysis

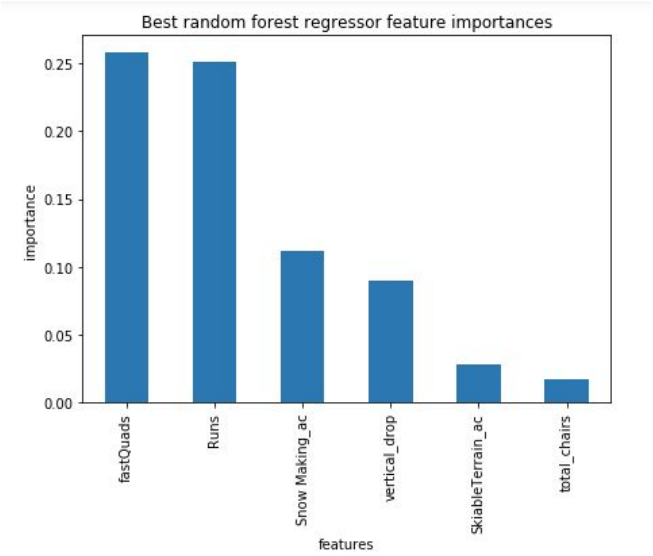
Principal Component Analysis reveals no grouping of resorts' ticket prices based on either their state or region meaning the resorts could be directly compared to each other without considering their location. Heatmap and scatterplots indicate a number of potentially worthwhile correlations between our target variable 'AdultWeekend' and the following features: number of fastQuads, number of runs, total number of chairs, magnitude of vertical drop, number of acres covered by snow-making machines, and to a lesser extent, the ratio of night-time skiing with respect to the state total.



[1] assuming a free market scenario in which ticket price is directly related to the desirability of facilities offered.

Model Training and Selection

A linear regression model (LR) and a random-forest regression (RFR) model were constructed, trained, and validated using 5-fold cross-validation The RFR outperforms the LR in terms of both variance explained (just over 70%) and mean absolute error ($10.4) and is therefore our choice to implement on the business problem at hand. The model indicates the following features as the most important in determining supported ticket price, in order of decreasing importance: fastQuads, Runs, Snow Making_ac, and vertical_drop.



Evaluating BMR's Current Ticket Price

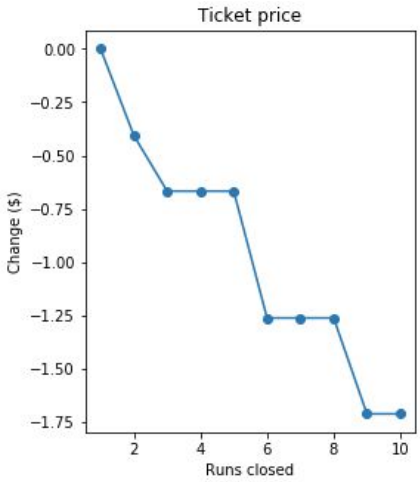
Big Mountain Resort (BMR) currently charges $81.00 per adult ticket (weekend or weekday). It hosts 350,000 annual visitors who, on average, ski for 5 days, thus purchasing 5 tickets each for a total of 1,750,000 tickets per year.

Our RFR predictive model indicates that BMR's facilities support a ticket price of just over $94.00 per adult. Even considering the mean absolute error of $10.4, this suggests room for a supported increase in ticket price of at least $2.5, leading to a potential increase in revenue of over $4.35mln. We strongly advise management to commission a careful analysis of operating costs before arriving at a final decision regarding any potential increase in ticket price.

Predicting Impact of Facility Improviments

Four scenarios have been modelled to predict the impact of any future improvements or alterations to the resort's facilities on the supported ticket price. Two scenarios are worth considering as they could result in considerable increase in revenue.

Scenario 1 (closing up to 10 runs) predicts no change in the supported ticket price when closing 1 run. Because this would entail a significant reduction in operating costs, we recommend this as a potential quick-win. Closing more than 1 run will lead to reductions in the supported ticket price. We advise testing with the closure of 1 run before proceeding to close more.



Scenario 2 (adding 1 run, increasing vertical drop by 150ft., and adding 1 chairlift) predicts an increase in the supported ticket price of almost $2 leading to a further increase in revenue of $3.5mln. Further analysis of the operating costs needs to be conducted before definitive conclusions can be made.

Next steps

To further improve the model, we strongly recommend:

- providing and incorporating operating costs for BMR facilities
- finding and incorporating annual ticket sales for other resorts

Once these steps have been completed and the model has been updated, we will:

- export the model to an environment accessible to BMR's business analysts who can independently tweak parameters to further explore impacts of changes to the park
- schedule regular bi-monthly check-ins to assess whether the model is still up-to-date with regards to any changes in the park and/or any changes in the market segment.