**Objective**

The goal of this project was to increase Big Mountain Resort net profit margin by ≥ 1 percentage point over the next ski season by re-evaluating current ticket prices and facilities provided relative to other resorts within the same market segment. Here, we aim to 1) benchmark ticket price to other resorts in market segment based on specific features or facilities available, and 2) better understand the facilities available at Big Mountain relative to its competitors, particularly which can be eliminated without negatively impacting ticket price.

The business has four specific scenarios shortlisted; these will be individually evaluated for their predicted impact on ticket price support. These scenarios are:

1. Permanently closing down up to 10 of the least used runs. This doesn't impact any other resort statistics.
2. Increase the vertical drop by adding a run to a point 150 feet lower down but requiring the installation of an additional chair lift to bring skiers back up, without additional snow making coverage
3. Same as number 2, but adding 2 acres of snow making cover
4. Increase the longest run by 0.2 mile to boast 3.5 miles length, requiring an additional snow making coverage of 4 acres

**Materials & Methods**

Data: Database export of information and features for 330 resorts within the same market share as Big Mountain Resort. No additional data collection is required, as there is virtually no change in model quality metrics once sample size passes 50 (see figure below).

A graph with a line

Description automatically generated

Model selection: The mean alone was found to be a poor predictor (negative R2 values with the test set). Two models were compared: linear regression and random forest. Pre-processing for linear regression began with imputing missing values based on the median and then scaling all values. To avoid overfitting, a cross-validated grid search was performed and found that the analysis should use the 8 features with the highest F-statistics. For the random forest model, a cross-validated grid search was performed to evaluate the best approach for imputing missing values, whether to use scaling, and the number of trees to include; the search found that imputing based on the median was the best approach for this model as well, scaling the features did not provide any benefit, and the model should use 69 trees. The random forest model had a lower mean absolute error (MAE) for both the training and test sets than linear regression and was therefore chosen for use moving forward.

**Recommendations**

Of the four scenarios explicitly explored, only the first two scenarios are predicted to make an impact in ticket price support. As shown in the figure below, closing one run is expected to make no difference in the ticket price. As a test, several runs could be shortlisted and then sequentially closed temporarily. Impact could be tracked via the number of visitors to the park, social media reviews, or potentially even direct outreach to resort visitors. Closing more than one run is predicted to negatively impact ticket prices, although this can be subjected to a more nuanced analysis that incorporates operational costs if desired.

A graph of a price

Description automatically generated with medium confidence

The second scenario is also potentially promising, with the model predicting increased support for ticket price by $1.99, amounting to a revenue increase of $3,474, 638 over the season. However, the current model is capturing only the difference associated with already having particular features; a return on investment (ROI) analysis or equivalent is recommended in order to better capture the impact on installation and operating costs.

Caution should be exercised when raising ticket prices. The modelled price for Big Mountain is $95.87, significantly higher than the actual price of $81.00 even when taking into account the expected mean absolute error of $10.39. However, as illustrated in the figure below, it is among the most expensive resorts in the state. Bordering states show similar distributions. While no state-specific trends were identified during the exploratory data analysis, there may broader regional trends that need to be taken into account. Visitor geographic data or insights into how visitors choose between resorts may help navigate this gap.

A graph with blue lines

Description automatically generated