Problem statement

What opportunities exist for Big Mountain Resort to generate at least a $1,540,000 increase in revenue in the upcoming season through better pricing strategy or cost-cutting?

Data Wrangling

During this step, we investigated the datatypes and the missing values in each column. Most features are numeric, and those with excessive missing values are identified (fastEight dropped, fastSixes, and trams flagged as use with care). We also investigated rows containing outlying values and corrected or dropped as needed (instances in SkiableTerrain_ac, Snow Making_ac, yearsOpen). Furthermore, to generate a state-wide summary, information on population and area for the states were cleaned and added as well. Lastly, we chose weekend ticket prices as the target feature as Big Mountain Resort is based in Montana, where we found weekday and weekend prices are largely equal, and there are fewer missing values for weekend ticket prices.

Exploratory Data Analysis

With the cleaned data frame, we first looked into how the home state, Montana, compares to other states with a principle component analysis (PCA). We concluded that there is no clear pattern for the states to be treated differently. Finally, we generated a features heatmap to visualize the correlation between features:
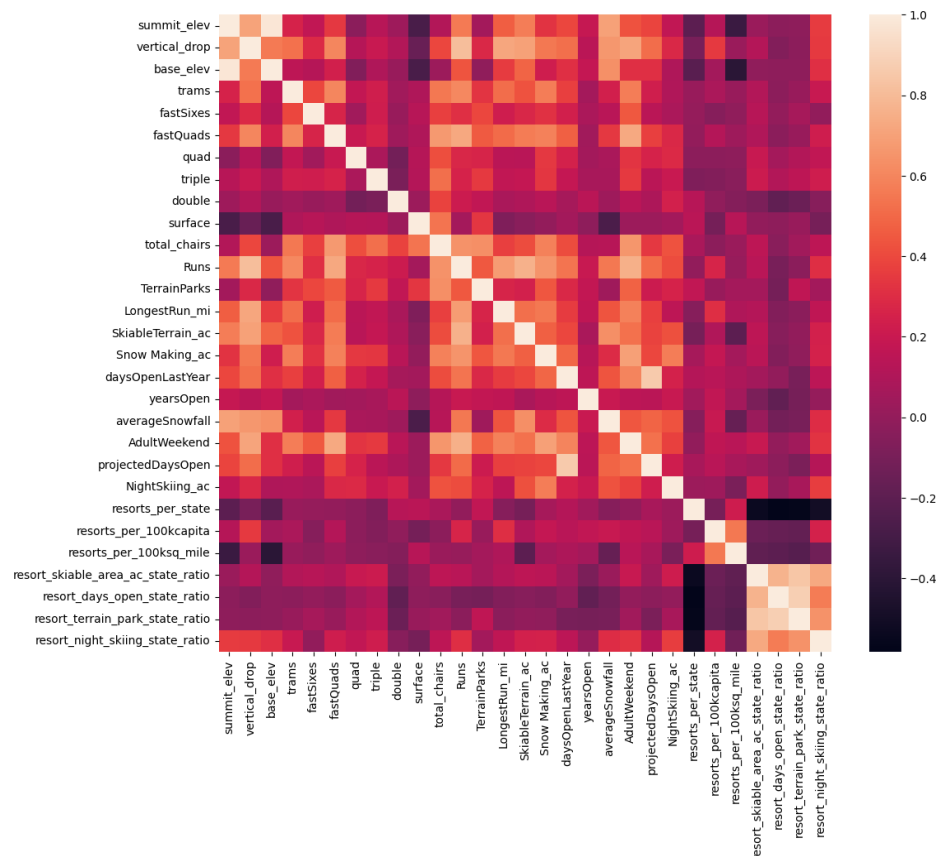
Notably, the features vertical_drop, fastQuads, Runs, Snowmaking, runs, and total chairs seemed to stand out and deserve special interest in modeling.

Model Preprocessing with feature engineering

The data were imported, and train/test split was performed for model evaluation. We established the baseline for model performance with the mean as the predictor. We ran different metrics on the performance of the mean, and notably, this has the mean absolute error of ~$19.14 on the test split.

Algorithms used to build the model with evaluation metric

Two models were built on train split and compared on test split – a linear model and a random forest model. The random forest model produced a lower cross-validation mean absolute error (~$9.54) as well as less variability so it was chosen for subsequent analysis. We found the top 4 features in this model to be fastQuads, Runs, Snow Making_ac, and vertical_drop. Last but not least we found the quantity of data (number of rows) to be satisfactory.

Winning model and scenario modeling

Now, training the model on all data except for Big Mountain Resort, we found that Big Mountain Resort's modeled price is $95.87, and the actual price is $81.00. Even with the expected mean absolute error of $10.39, this suggests there is room for an increase.
We then compared Big Mountain Resort with others in the market share and found that it leads in the facilities it offers but also errs on the higher side price-wise. Therefore, shortlisted options from the business were also modeled, and of these options, it seems closing down some least-used runs may be most effective in generating profit as it reduces operating costs without changing the perceived value of the tickets by too much.
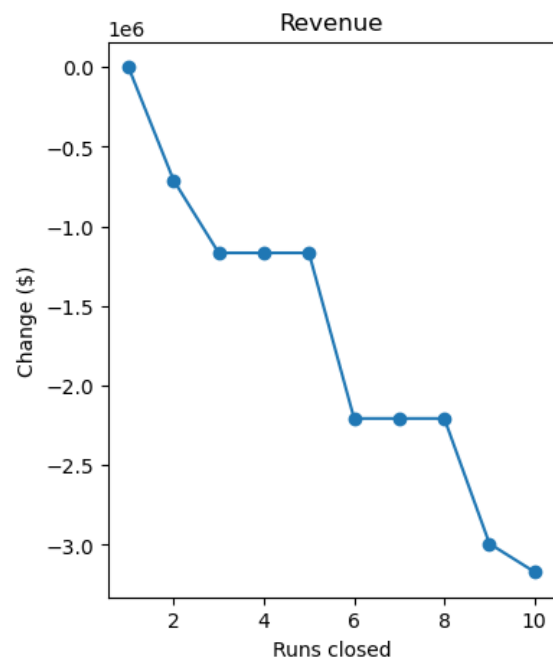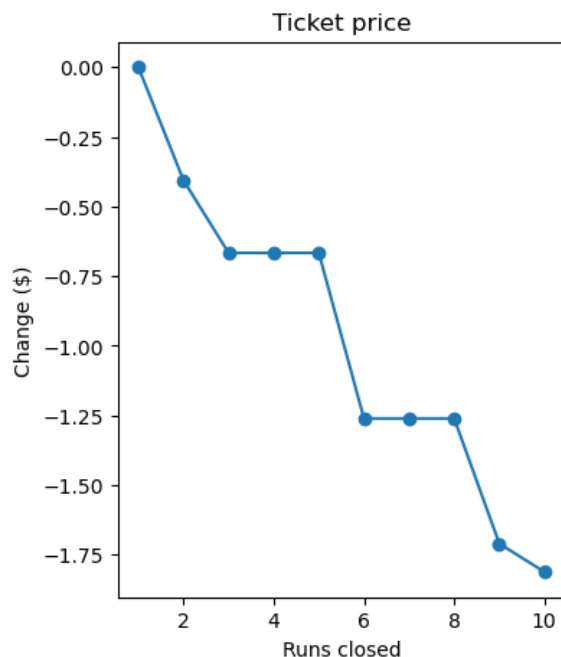
Pricing recommendation

To cover the operation cost of $1,540,000 from the new lift, assuming 350,000 visitors buying 5 passes each, would require a $0.88 increase in ticket price. The facilities of Big Mountain Resort should support such an increase; however, a reduction in operational cost should also be considered as discussed above.

Conclusion

Big Mountain Resorts has some of the best facilities on the market, and the tickets hold a higher value than they are currently priced. However, there may be room for profit in reducing operational costs as well which should be considered for the upcoming season.

Future scope of work

The currently available data reflects the other resorts' opinions on the pricing of tickets and does not include information on sales. A more informed decision could be made if the customers' responses to the different pricing could be made available. Furthermore, the operational cost also plays a huge part in the profitability of the resort, and further data and insight on that would be greatly helpful.