Big Mountain Resort Ticket Pricing Analysis

Problem Statement

Big Mountain Ski Resort currently charges $81 for an adult weekend ticket. The objective is to enhance profitability by implementing premium pricing strategies and streamlining internal cost management, informed by a comparative analysis of pricing and facilities at other ski resorts nationwide.

Data Wrangling & Exploratory Data Analysis

The dataset included both numeric and categorical features; however, categorical variables such as *Name*, *Region*, and *state* were excluded from the analysis. For modeling, we will focus on resort-level numeric features and engineered ratios derived from state and dataset-level information, with *AdultWeekend* ticket price selected as the target feature.

Key observations from the exploratory analysis include:
- Summit and base elevation are strongly correlated.
- Several engineered ratio features exhibit multicollinearity and are negatively correlated with the number of resorts in each state.
- A positive correlation exists between the ratio of night skiing area and the number of resorts per capita.
- *Resort_night_skiing_state_ratio* shows the strongest correlation with ticket price among engineered features.
- Both *Runs* and *total_chairs* display strong positive correlations with ticket price.
- Vertical drop also appears to be a significant factor contributing to higher ticket prices

Model Preprocessing & Feature Engineering

Model Preprocessing & Feature Engineering: Began with mean value prediction as a baseline, followed by Linear Regression and Random Forest models. Implemented pipelines with 5-fold cross-validation and GridSearchCV to optimize preprocessing and feature engineering.

Algorithms and Evaluation

Algorithms were evaluated using Mean Absolute Error (MAE). Linear Regression achieved MAE of 10.49 (mean train), 1.62 (std. dev train), and 11.79 (test). Random Forest achieved MAE of 9.64 (mean train), 1.35 (std. dev train), and 9.54 (test). With nearly $1 lower cross-validation MAE, Random Forest outperformed Linear Regression and was selected as the best model.

Model Findings & Pricing Recommendation

The current Big Mountain Ski Resort price is $81, while the model predicts a price of $95.87 with a Mean Absolute Error (MAE) of $10.39. Considering the error margin, a safe recommendation is to increase ticket prices by $5–$7 per ticket.

Scenario Modeling

Out of the four scenarios evaluated, two show a significant impact on business:

- Scenario 2 – Adding a new run, increasing the vertical drop by 150 feet, and installing an additional chair lift. This supports a ticket price increase of $1.99, translating to an estimated $3,474,638 in additional seasonal revenue.

- Scenario 3 – Building on Scenario 2 by adding 2 acres of snowmaking. This also supports a $1.99 price increase, with a similar revenue impact of $3,474,638.

Considering cost factors, the recommended pricing adjustment is: $81 (current) + $5–$7 (from baseline model) + $1.99 (from scenario impact). Other scenarios can be disregarded due to negligible revenue impact.

Conclusion

The analysis indicates that Big Mountain Ski Resort is currently underpriced relative to market benchmarks and modeled predictions. Based on Random Forest modeling and scenario analysis, a safe and strategic price increase of **$5–$7 per adult weekend ticket** is recommended, with potential for an additional **$1.99** justified through infrastructure enhancements such as a new run, added vertical drop, chair lift installation, and snowmaking capacity. These adjustments balance profitability with customer value.