Recommendation Report for Big Mountain Resort

1. Introduction & Problem Context

Big Mountain Resort, located in Montana, has recently invested $1.54 million in a new chairlift, raising concerns about covering these additional operating costs. Historically, its pricing strategy was to set ticket prices just above the average market rate for comparable resorts. However, management suspects this simplistic approach does not accurately reflect how facilities (e.g., number of lifts, terrain parks, snowmaking acreage, and skiable acreage) influence perceived value. The resort's main objective is to achieve at least a 10% profit increase next season, without losing the roughly 350,000 annual visitors who drive revenue.

2. Data Preparation & Exploration

Our dataset contained 330 U.S. ski resorts, each described by ticket prices, facility counts, and terrain-related statistics. After investigating missing data in the data wrangling stage, we removed entries lacking valid AdultWeekend prices (about 15–16% of records) and discovered that fastEight was over 50% missing. We also merged state-level data (population, total ski area) to form key features such as resorts_per_100k population and resort_skiable_area_ac_state_ratio. This process yielded 277 cleaned resort records, including Big Mountain.

Subsequent Exploratory Data Analysis revealed several key correlations with weekend price:
- Vertical Drop: Resorts with higher vertical drop often command higher ticket prices.
- Skiable Acreage & Total Chairs: Larger areas with more lifts can sustain higher pricing due to perceived value.
- Snowmaking Acreage: Reliable snow conditions can raise willingness to pay.

By focusing on these influential features, we prepared for a more accurate predictive model.

3. Modeling Approach & Evaluation

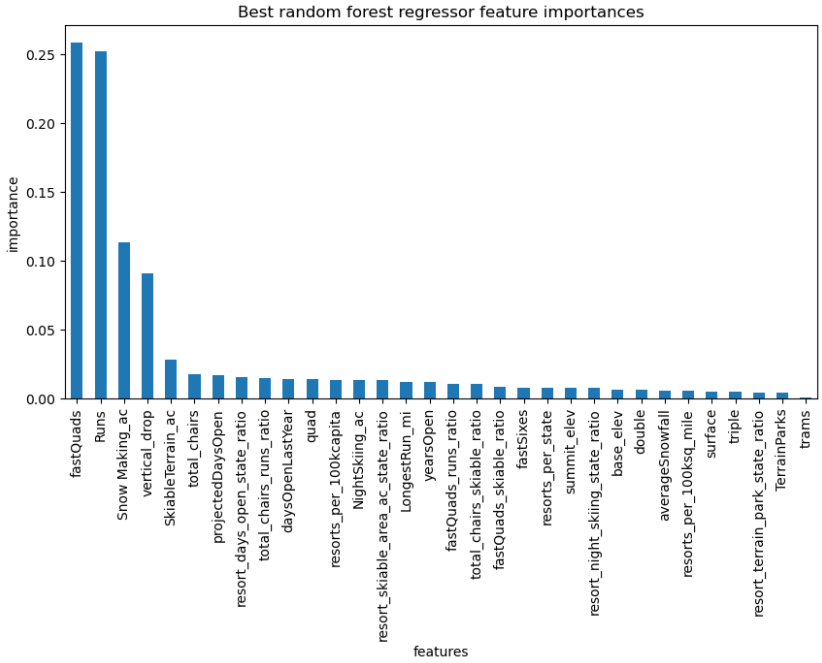
We designated AdultWeekend price as our predictive target. To avoid bias, Big Mountain's own row was excluded from training data, ensuring the final predictions were purely market-driven. As described in preprocessing and training stage, we:

- Split data into training and testing sets (70/30).
- Imputed missing numeric values (e.g., median fill).
- Scaled features (standardization).

We first fitted a DummyRegressor (predicting the average price), achieving a baseline mean absolute error (MAE) of ~$18. Comparing a Linear Regression model and a Random Forest model via cross-validation, the Random Forest achieved a slightly lower MAE of $10.39 compared to $10.50 for Linear Regression, reflecting a minor improvement of approximately $0.11.

4. Winning Model, Scenarios & Figures

Having selected the Random Forest, we retrained it with all resorts except Big Mountain's row. This final model predicted Big Mountain's AdultWeekend price to be $95–$96, distinctly higher than the current $81. Even allowing for a $10 margin of error, the model strongly suggests a potential underpricing. We found out that number of fast quads, runs, snow making area covered, vertical drop, and skiable terrain area were the most important features for our model and explored scenario modeling by altering some of those features for Big Mountain:



- Increasing the longest run by 0.2 miles and increasing area covered under snow making by 4 acres did not suggest any increase in price.
- Just adding one extra chair, keeping all else the same suggested a price increase by $0.29, resulting in increased season revenue of $0.5M, not enough for installing and maintaining a chair lift.
- Adding a run, increasing vertical drop by 150 feet and installing an additional chair lift suggested we could increase the price by $1.99, resulting in increased season revenue of $3.5M.

5. Recommendations & Conclusion

Based on our Random Forest findings and the resort's strong feature set (notably vertical drop, significant acreage, and multiple high-capacity lifts), we advise raising Big Mountain's AdultWeekend ticket price to around $90–$95. This range balances revenue goals with anticipated visitor retention. If successful, the resort stands a good chance of meeting its 10% profit target and recovering the added $1.54 million lift cost within a reasonable timeframe.
If executives are unwilling to increase price by $15, they should increase the price by at least $5 keeping the $10 margin of error of our model in mind. Since they are installing a new chair lift, executives should also consider adding a run, and increasing vertical drop by 150 feet as our model suggests that would support a price increase of another $2, leading to increased revenue by $3.5M, enough to sustain the costs of the chair lift and generate more profit.
While these insights are highly promising, they do not account for Big Mountain's detailed operating costs list costs of maintaining runs, lifts, chairs, nor the potential impact of external factors like weather fluctuations or macroeconomic trends. We recommend collecting more granular data—especially visitor demographics, length of stay, and cost breakdowns—to refine this model further and to potentially explore dynamic pricing based on seasonal or real-time demand.

Key Next Steps:
- Integrate Cost Details: Tying expenses and profit margins to our existing features would yield a more precise ROI estimate for any operational or infrastructural upgrades.
- Analyze Visitor Segmentation: Gathering data about traveler origins, income brackets, and preferences would help tailor pricing and marketing strategies.
- Monitor Market Competition: Continuing to track competitor resorts ensures Big Mountain stays competitive while maximizing revenue.

By leveraging a data-driven pricing framework, Big Mountain Resort can more confidently adjust its price structure, focusing on improvements with the highest guest-perceived value while safeguarding the overall skiing experience.