Guided Capstone Project Report
Big Mountain Resort

1. Introduction

Big Mountain Resort seeks data-driven recommendations for optimizing its daily ticket pricing and understanding which operational or capital improvements would most increase the resort's perceived value. To address this, a predictive modeling approach was applied using ski resort data that includes pricing, terrain features, snowmaking capacity, lift infrastructure, and resort scale. This report summarizes key findings from exploratory data analysis (EDA), model development, scenario testing, and final recommendations.

2. Data Summary and EDA Findings

The dataset included multiple U.S. ski resorts with attributes such as vertical drop, skiable terrain acreage, total lifts, snowmaking acreage, longest run length, and current day ticket price. After preprocessing, missing values were addressed, categorical features were encoded where applicable, and continuous variables were standardized or scaled when needed.

EDA revealed strong trends between resort size and pricing.

- **Figure 1** (Ticket Price Distribution by Resort Size): Larger resorts showed higher price ranges, suggesting a value perception linked to scale.
- **Figure 2** (Scatter Plot: Price vs. Vertical Drop): A clear positive relationship was observed, indicating that greater vertical drop often justifies higher pricing.
- **Figure 3** (Correlation Heatmap): Vertical drop, terrain acreage, and lift capacity displayed high correlation with ticket price, while longest run length had low predictive value.

3. Modeling Approach

A linear regression model was trained using all resorts except Big Mountain to avoid leakage. Feature engineering steps resulted in a finalized set of variables such as vertical drop, total lift count, skiable acreage, snowmaking acreage, and number of runs. The model demonstrated robust interpretability, revealing that resort capacity and terrain scale were the most influential pricing drivers.

Although other regression techniques (e.g., regularized or tree-based models) could improve performance, linear regression provided a clear understanding of how incremental changes to specific resort features affect pricing support.

4. Scenario Testing

The final model was used to simulate the impact of operational and physical changes for Big Mountain Resort:

- **Scenario 1: Baseline prediction** – The model estimated Big Mountain's fair ticket price based on current attributes.
- **Scenario 2: Increased core mountain scale** (e.g., vertical drop increase, added chair lift, and additional terrain): Resulted in a notable increase in supported price, indicating that investments in core mountain capacity would boost pricing potential.
- **Scenario 3: Added snowmaking acreage only** – Showed minimal impact on pricing, suggesting that small incremental snowmaking increases do not significantly influence perceived value.
- **Scenario 4: Increase in longest run length with minor snowmaking** – Produced negligible pricing movement, reinforcing that longest run is a low-impact feature.
- **Run Closure Analysis** – Closing a single run showed little impact; however, extensive closures (6 or more runs) significantly reduced pricing support, indicating the importance of maintaining full terrain availability during peak times.

5. Conclusion

The modeling process provided actionable insights into how resort attributes influence day ticket pricing. The findings indicate that core infrastructure—vertical drop, terrain, and lift capacity—offer the most significant return on investment from a pricing perspective. Ongoing data monitoring and iterative modeling will help Big Mountain Resort continue refining pricing strategies and capital planning decisions.