# Guided Capstone Project Report

# Introduction

This report presents an analysis of ski resort pricing with a focus on Big Mountain Resort. The goal is to provide actionable insights and recommendations based on data-driven modeling. The analysis includes data preparation, exploratory data analysis, model development, and scenario analysis.

# Data Preparation and Initial Insights

Data Wrangling: Loaded the dataset, displayed data structure, and examined the first few rows. Addressed missing values and outliers, corrected unrealistic values. Filtered for Big Mountain Resort and checked for duplicated names. Analyzed the distribution of resorts by state and region using bar plots. Aggregated state-level statistics to understand market size and distribution.

Exploratory Data Analysis: Visualized the distribution of resorts by state and key features. Principal Component Analysis (PCA) was used to reduce dimensionality and identify key patterns.

Feature Engineering: Derived new features such as resort-to-state ratios for skiable area and days open.

# Modeling and Evaluation

Baseline Model: A dummy regressor using the mean value established a baseline for comparison.

Linear Regression: Initial linear regression model showed overfitting due to high feature count. Feature selection using SelectKBest improved model performance.

Random Forest Regressor: Optimized using GridSearchCV for hyperparameter tuning. Showed better generalization and performance consistency compared to linear regression.

Model Performance: Cross-validation scores for negative Mean Absolute Error (MAE) indicated the random forest model’s robustness.

Predicted Ticket Price for Big Mountain Resort: Current ticket price: $81.00. Model suggested price: $90.82. Indicates potential for price increase based on resort offerings and market conditions.

# Predictions

1. Predicted vs Actual Ticket Prices Over Observations

A graph with blue and orange lines

Description automatically generated

1. Residuals Distribution

A graph of a distribution

Description automatically generated

1. Actual vs Predicted Ticket Prices

A graph of a line graph

Description automatically generated with medium confidence

# Scenario Analysis and Recommendations

Scenario 1: Closing Runs: Analyzed the impact of closing 10 runs on ticket price and revenue. Result: Gradual reduction in ticket price with each run closed.

Scenario 2: Increasing Vertical Drop and Adding Chair Lift: Increased vertical drop by 150 feet and added a chair lift. Result: Significant increase in ticket price and seasonal revenue by $0.18 per ticket and $315,000 in total.

Scenario 3: Adding Snow Making Coverage: Like Scenario 2, with additional snow-making coverage. Result: Further enhancement in ticket pricing and revenue potential by $0.18 per ticket and $315,000 in total.

Scenario 4: Extending Longest Run: Added 0.2 miles to the longest run and increased snow-making coverage. Result: Moderate increase in ticket price and seasonal revenue by $0.08 per ticket and $140,175 in total.

Recommendations:

1. Increase Ticket Price: Consider raising the ticket price to the model’s suggested $90.82, supported by data-driven insights.

2. Scenario Implementation: Focus on Scenario 2 and Scenario 3 for significant revenue enhancement.

3. Data-Driven Run Closures: Implement a pilot closure, collect data, and analyze impacts before scaling.

4. Further Data Collection: Gather data on operational costs, visitor demographics, and competitor pricing.

5. Model Utilization: Use the model for scenario testing and strategic planning.

6. Accessibility: Develop tools for business analysts to independently use the model.

# Conclusion

This report provides a comprehensive analysis of ski resort pricing with actionable recommendations for Big Mountain Resort. The Resort's current ticket price of $81.00 is below the optimal price point. The suggested price, based on the resort’s offerings and market conditions, is $90.82. This indicates a potential for increasing the ticket price by approximately $9.82 per ticket. Then they should take the extra revenue and use it for strategic enhancements for the Resort. Increasing the vertical drop, adding chair lifts, and enhancing snow-making coverage, the resort can justify higher ticket prices and attract more visitors. Implementing the recommended scenarios and continuously collecting and analyzing data will help in refining the pricing strategy and maximizing revenue.

# Future Scope of Work

The findings from this analysis provide a solid foundation for further exploration and improvement in ski resort pricing and operational strategies. Here are several potential areas for future work:

**1. Advanced Pricing Strategies:**

* Develop algorithms to adjust ticket prices in real-time based on demand, weather, and seasonal variations.
* Implement personalized pricing for different customer segments (e.g., families, students, frequent visitors).

**2. Enhanced Data Collection:**

* Gather detailed cost data on resort features to inform financial analysis.
* Collect data on visitor preferences and spending to tailor offerings and marketing.
* Monitor competitor pricing and facilities to benchmark performance.

**3. Operational Efficiency:**

* Use data to manage the number of open runs based on demand and conditions.
* Optimize the use of snow-making equipment and lifts for cost efficiency and visitor experience.

**4. Visitor Experience Enhancement:**

* Implement systems to gather and act on visitor feedback.
* Explore adding new features and activities to attract visitors and justify higher prices.

**6. Technology Integration:**

* Use IoT devices for real-time data on operations and visitor movements.
* Develop apps for real-time information on run availability, weather, and personalized recommendations.

**7. Scenario Testing and Simulation:**

* Use simulations to test operational and pricing scenarios before implementation.
* Develop strategies to handle unexpected events like extreme weather or sudden changes in visitor numbers.

Pursuing these areas will help Big Mountain Resort refine pricing strategies, improve operational efficiency, enhance visitor satisfaction, and ensure sustainable growth. Continuous data collection and analysis will be crucial for adapting to market conditions and maintaining a competitive edge.