What drives Ski Resort Ticket Prices?

Context:

- Big Mountain Resort has added a new chair lift, raising annual operating costs by $1.54 million.
- Current ticket prices sit slightly above the market average but don't reflect the resort's full facility value.
- The goal is to use a data-driven approach to optimize ticket pricing so it aligns with the resort's premium features and offsets higher operating costs

Criteria for Success:

- Identify the facility-level features most correlated with ticket price across comparable U.S. resorts.
- Provide data-driven guidance on selecting a more accurate price point.
- Recommend an optimal ticket price that offsets the $1.54 M cost increase while remaining competitive.

Scope of Solution Space:

- Analyze data from ~330 U.S. ski resorts, including Big Mountain.
- Explore how attributes such as lifts, runs, vertical drop, snowfall, and region influence ticket prices.

Dataset Overview
• 330 U.S. Resorts
• Target: Adult Weekend Ticket Price

Source: Big Mountain Resort Problem Statement Worksheet (Hypothesis Formation)

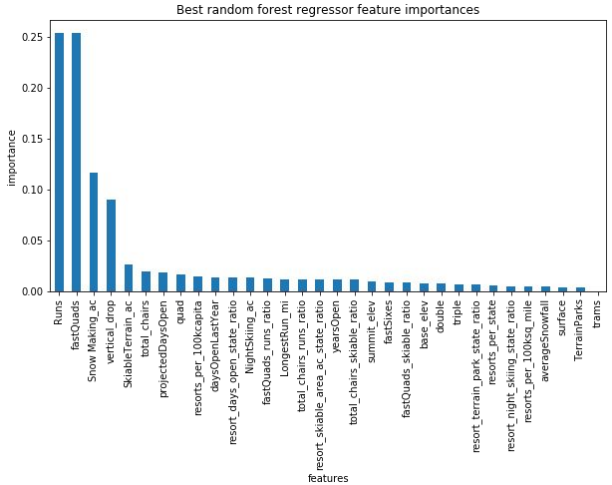
Recommendation & Key Findings

Summary:

- Big Mountain Resort should adjust ticket pricing upward 5–10 % to reflect its strong facility profile.
- Pricing should be anchored to measurable resort features: Vertical Drop, Runs, and Total Chairs. These show the strongest influence on ticket price.
- This approach can offset the $1.54 M annual chair-lift cost while keeping rates competitive with top-tier resorts.
- Recommend a feature-based pricing model updated seasonally with new resort data.

Key Findings:

- Top Predictors: Vertical Drop, Runs, and Total Chairs are most strongly correlated with ticket price.
- Model Performance: Random Forest $R^2 \approx 0.82$ (outperformed Linear Regression ≈ 0.64)
- Interpretation: Infrastructure and scale, not geography, explain most of the price variance.

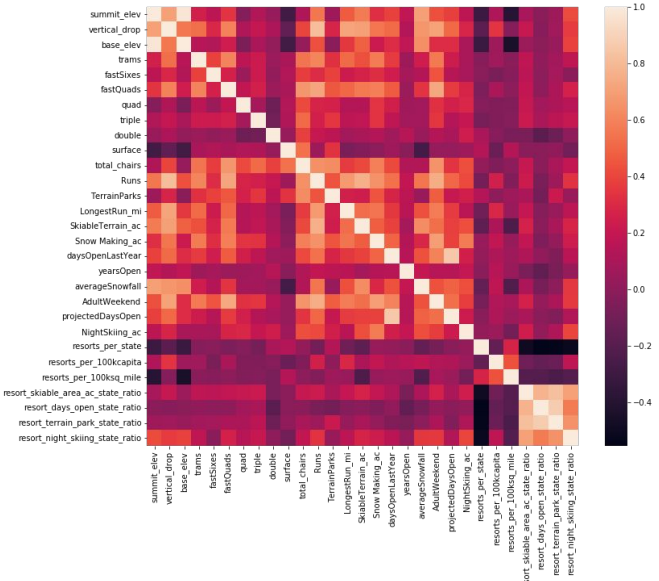


Understanding Key Relationships Before Modeling

Key Insights:

- Vertical Drop, Runs, and Total Chairs show the strongest positive correlations with Adult Weekend Ticket Price.
- Snow Making % and Skiable Terrain (acres) also trend upward, though more moderately.
- Low or near-zero correlations (e.g., TerrainParks, NightSkiing) indicate limited pricing impact.
- Groups of highly related variables reveal that infrastructure features like lifts, runs, and terrain size tend to rise together.

Larger, better-equipped resorts consistently command higher ticket prices, confirming intuition with data-driven evidence.



Correlation heatmap of resort features and ticket prices (Big Mountain EDA Notebook)

Evaluating Model Accuracy – Linear vs Random Forest

Models Tested

- **Linear Regression**: Baseline model to measure general linear trends.
- **Random Forest Regressor**: Non-linear ensemble model capturing complex feature interactions.

Takeaways:

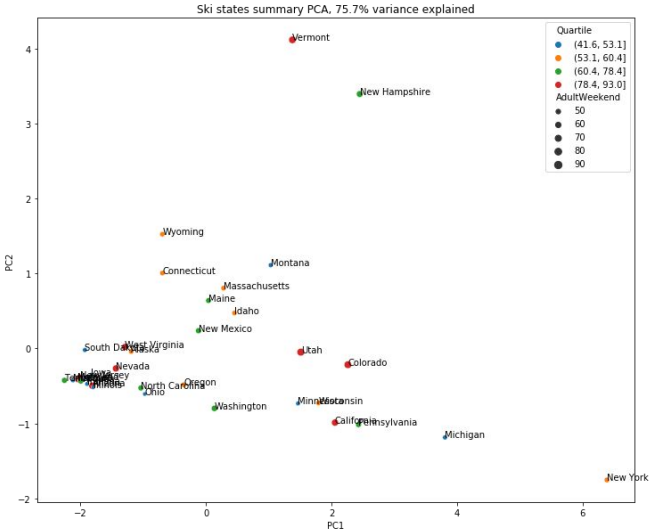
- Random Forest provided better overall fit ($R^2 = 0.82$), reducing prediction error by roughly 35 %.
- It captures non-linear relationships among features such as Runs, Vertical Drop, and Snow Making %.
- Linear Regression underestimates price for high-end resorts, missing interaction effects between large infrastructure variables.

Random Forest delivers a more realistic, data-driven pricing model

Regional Price Tiers Across U.S. Ski States

Key Insights:

- PCA analysis (75.7 % variance explained) groups states with similar resort profiles.
- Premium tier states: Vermont, New Hampshire, Colorado, Utah show higher predicted prices and stronger infrastructure metrics.
- Mid-range tier: Montana, Maine, Wyoming balance facility size with moderate pricing.
- Value tier: Michigan, Pennsylvania, New York have smaller vertical drops and fewer lifts, leading to lower average ticket prices.
- Indicates geography alone doesn't dictate price; facility scale and quality drive these clusters.



Principal Component Analysis showing state-level clustering by facility features and ticket price quartiles

The PCA results show that Big Mountain's characteristics align closely with the premium resort cluster, states like Colorado, Utah, and Vermont, where larger vertical drops, more runs, and higher snowmaking coverage drive stronger pricing power.

Conclusion & Future Opportunities

Summary of Findings:

- Analysis of 277U.S. ski resorts identified facility-level feature like Runs, Snow Making %, and Vertical Drop as the strongest drivers of ticket price.
- Random Forest model ($R^2 = 0.82$) accurately predicts optimal pricing, outperforming the linear baseline.
- Model indicates Big Mountain's current ~$78 price is below predicted optimal range ($82 – $86).
- A 5–10 % price increase would align pricing with comparable premium resorts and offset the new $1.54 M annual chair-lift cost.

By aligning ticket pricing with measurable resort attributes, Big Mountain can achieve a data-driven, defensible pricing strategy that sustains revenue growth while maintaining competitiveness.

Next Steps:

- Integrate dynamic pricing tied to seasonal and weekend demand.
- Continue monitoring customer satisfaction and occupancy rates to refine model calibration.
- Expand dataset to include weather, visitor traffic, and marketing spend for future iterations.
- Re-evaluate pricing model annually to capture new resort or regional developments.