What is the next step for Big Mountain Resort?

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Problem Identification

Big Mountain Resort has recently installed an additional chair lift that cost 1,540,000 in operating cost this season

The Big Question:

How can Big Mountain Resort improve pricing strategies to generate at least an additional of $2,000,000 in revenue by the next season through identifying specific facilities that are the most attractive to customers (i.e., the most predictive of ticket price) and areas to cut costs?

Data and Goal

A dataset on 330 ski resorts across the United States that contains information regarding resort facilities and ticket price

Conducted data wrangling and cleaning

- Decision: Adult Weekend Ticket Price as the key target feature

Goal: Identify features/facilities that are most predictive of ticket price

Modeling and Results

Also obtained state-level data from Wikipedia

Conducted a principal component analysis (PCA) to simplify the state-level information

- Two components

However, the state-level information did not appear to be related to ticket price

- Decision: Treat all states equally

Key resort features that are correlated with ticket price:

Vertical drop	Number of all chair lifts
Number of fast four-person chairs	Skiable area
Number of runs	Area covered by snow-making machines
Number of trams	Night skiing area

Modeling and Results

Conducted a baseline model for comparison (using mean ticket price to predict ticket price)

Applying machine learning techniques:

- Use pipeline to automate the modeling process
- Use cross-validation to assess performance
- Use grid search to automate tuning hyperparameters
- Compare models based on model performance

Two machine learning models

- A linear regression model
- Random forest model (winning model)

Four most important features from the random forest model:

Number of fast four-person chairs	Area covered by snow-making machines
Number of runs	Vertical drop

The Four Shortlisted Scenarios

#1. Permanently closing down up to 10 of the least used runs.

#2. Increase the vertical drop by adding a run to a point 150 feet lower down but requiring the installation of an additional chair lift to bring skiers back up

#3. Same as number 2, but adding 2 acres of snow making coverage

#4. Increase the longest run by 0.2 mile, which requires an additional snow making overage of 4 acres

Modeling results:

#1 Closing one run makes no difference, closing 2 and 3 runs may lower ticket price/revenue, but if one decided to close more than 1 run, may just close down 5 runs without additional loss

#2 supports ticket price increase by $1.99, expected to amount to $3,474,638 in revenue

#3 and #4 make no difference in ticket price/revenue

Key Findings and Recommendations

Most important features identified:

- Number of fast four-person chairs
- Area covered by snow-making machines
- Number of runs
- Vertical drop

Big Mountain Resorts are much above average on these 4 features compared to their competitors

Recommendations:

- Current adult weekend ticket price for Big Mountain Resort is $81. Random forest model suggests there is room for an increase to $95.87 (±$10.39) based on current facilities
- Add a run to increase vertical drop by 150 feet with an addition of chair lift, and further increase ticket price

Summary and Conclusion

Recommended actions:

1) Increase ticket price. There is room for Big Mountain Resort to increase ticket price from $81 to $95.87 with current facilities

2) Add a run to increase vertical drop of 150 feet with an addition of a chair lift may further increase ticket price by $1.99, resulting in an additional $3,474,638 in revenue. However, the cost of the additional chair lift needs to be accounted for

For future scenarios:

This machine learning model is useful for modeling ticket price in future scenarios

This machine learning model has been automated and can easily be applied and adjusted by business analysts to model future scenarios to inform business decisions