Optimization of Big Mountain Resort’s Ticket Price and Facilities Management

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Context / Background

- Big Mountain Resort recently installed an additional chair lift that increases their operating costs by $1,540,000 this season.
- So far, the pricing strategy has been to charge a premium above the average price in the same market share and in Montana.
- However, there no concrete data to support current costs and/or ticket price.

Primary goal: To ensure Big Mountain Resort is capitalizing on their facilities and maximizing profit.

Problem Statement

How should Big Mountain Resort (1) cut costs across its facilities, (2) improve or add new facilities, and/or (3) select a new ticket price in order to increase this season's profit by at least 5% in comparison to the expected profit at the current price point?

Note: The data used for this project was taken from a provided spreadsheet containing relevant features for 330 ski resorts across the U.S. which are considered to be in the same market share.

Key Findings and Strategy Recommendation

Key Findings and Figures:

- Expected ticket price for Big Mountain Resort is **$95.87**, which is $14.87 greater than the current price of $81
- To cover the **costs of the additional chair lift** that was just installed + the original expected revenue, Big Mountain needs at least **298,927 visitors** this season at the increased ticket price
- To experience an additional **5% revenue increase** in comparison to the expected revenue for the season at the original price, Big Mountain needs at least **310,500 visitors** at the increased ticket price

Choosing **at least one** of the following strategies:

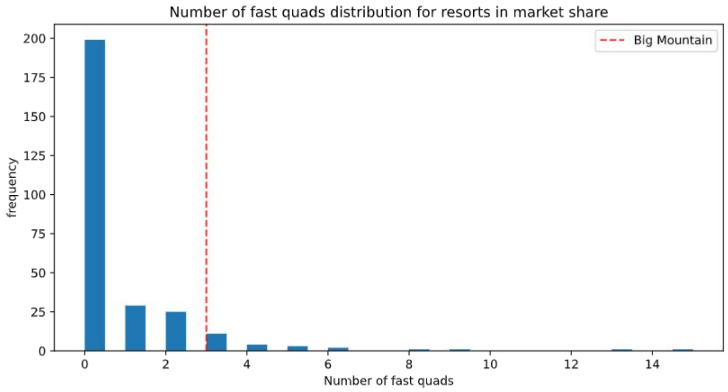
1. Permanently closing down up to 10 of the least used runs
2. Increase the vertical drop by adding a run to a point 150 feet lower down but requiring the installation of an additional chair lift to bring skiers back up, without additional snow making coverage
3. Same as number 2, but adding 2 acres of snow making cover
4. Increase the longest run by 0.2 mile, requiring an additional snow making coverage of 4 acres

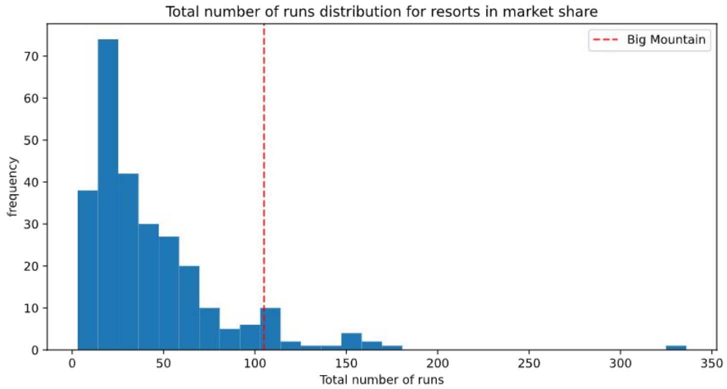
The model suggests that **strategies 1 and 2** are worth looking into, while 3 and 4 will most likely yield results that are no better than the first two.

Implementation Specifics

- Focused on predicting **weekend ticket prices only**
  - Ski resorts in Montana exhibit no difference between weekday and weekend prices
  - There are less missing values for weekday prices
- **State-level differences not taken into consideration**
  - No commonly observable differences between resorts from different states, even after considering the area and population of each state.
- Choice of model was made between (1) a linear regression model and (2) a random forest regression model, w/ **random forest regressor** coming out on top
  - Specifics of model choice are not as important — however, should note that the best possible model was chosen
  - On average, the final random forest regressor was around **$9.54 off** from the actual ticket prices of resorts, over a **50% decrease from the expected error of $19.14** when simply using the mean of ticket prices as a predictor

Important Price-Increasing Features





- Model considered these factors to be the most important, in the following order:
  - The number of fast quad lifts
  - The number of runs
  - Acres of snow making
  - Vertical drop height

- Big Mountain places near the top of the dataset in terms of both the **number of fast quads** and the **number of runs**, the two most important features by a mile.
  - Justifies the price increase from $81 to $95.14, although Big Mountain already charges a premium in comparison to other resorts

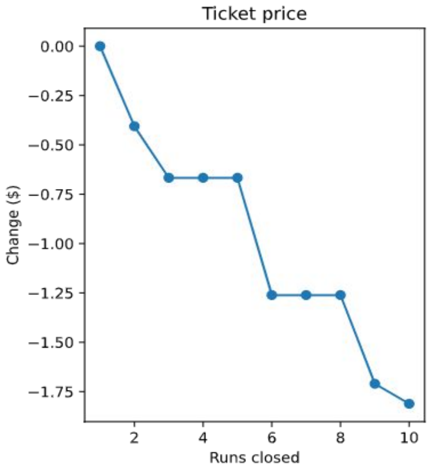
Analysis of Strategies

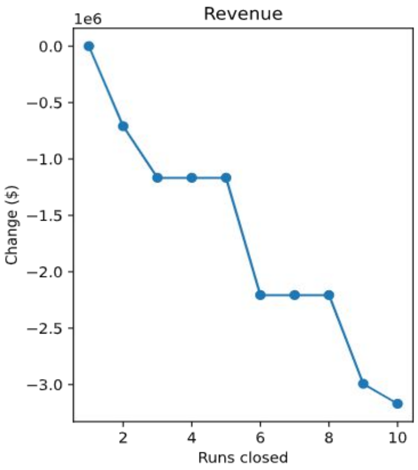
Scenario 1: Closing down *n* least used runs **(graph shown right)**

- Closing **5 or 8 runs** will likely be the most optimal — no loss in revenue compared to closing down 3 or 6 runs, respectively.
- Need more information on operational cost of each run to assess viability

Scenario 2: Increasing vertical drop by 150 feet and adding additional run and chair lift

- Increases support for ticket price by **$1.99**
  - Amounts to **$3,474,638** over the course of an entire season.
- Need further information on construction and operational costs of these facilities





Non-Viable Options

Scenario 3: Scenario 2 + two acres of snow making

- Predicted to increase the ticket price by no more than scenario 2, making scenario 2 more attractive

Scenario 4: Four acres of snow making and lengthening the longest run

- Causes 0 difference in support for the ticket price

Summary and Conclusion

Key action points

- **Adjust ticket price upwards** (taking into consideration the expected price of $95.14), given that it is validated by further market analysis from an economic standpoint
- **Compare and contrast the expected profit from scenarios 1 and 2** after taking into consideration the costs of closing down runs and/or adding 150ft of vertical drop + a new run and chair lift

If this model is deemed useful by the business side, further work can be done in coordination w/ engineering to deploy to an application environment (perhaps on the web) in which the UI can allow for various parameters to be tuned and varied.

Thank you for attending!