Data-Driven Approach For Big Mountain Resort's Ticket Pricing

Data Analyst - Jesse Ingraham

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Problem Identification (1/2)

- The current Big Mountain Resort ticket pricing is simply based on the market average with the addition of a premium, resulting in an **adult weekend ticket price of $81**.

- An additional chair lift was installed and it will **increase your operating costs by $1,540,000 this season**.

- There is speculation that the resort is not capitalizing on its facilities as much as it could.

- <u>The resort wants a data driven business strategy to guide ticket pricing.</u>

Problem Identification (2/2)

Big Mountain Resort’s shortlisted options:

1. Permanently closing down up to 10 of the least used runs. This doesn't impact any other resort statistics.

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 to boast 3.5 miles length, requiring an additional snow making coverage of 4 acres.

Recommendation and Key Findings

- The **current adult weekend ticket price** for Big Mountain Resort is **$81**.

- The **data-driven modeled price is $95.87** (calculated from the chosen random forest model).
  - Even with the model's expected mean absolute error of $10.39, this suggests there is room for an increase.
  - The modeled price is based on the current facilities Big Mountain offers and the rest of the country's resorts.

- If the resort increases the vertical drop by adding a run to a point 150 feet lower, but requires the installation of an additional chair lift to bring skiers back up, then the following should be considered: the model predicts an **increased support for ticket price by $1.99**. **Over the season, this could be expected to amount to an additional $3,474,638 in revenue**, with the assumption that the resort continued to receive 350,000 visitors that purchase 5 tickets on average over the course of the season. However, this additional revenue does not take into account the cost of installing or operating an additional ski lift.

Modeling Results and Analysis (1/4)

- Two models were fit to the dataset and their performances compared:
  - A linear model
  - A random forest regression model

- The random forest model was chosen because it has a lower cross-validation mean absolute error by almost $1. It also exhibited less variability. Verifying performance on the test set produced performance consistent with the cross-validation results.

Modeling Results and Analysis (2/4)

- For the random forest regression model:
  - A hyperparameter search was done using GridSearchCV to find the best parameter settings to use with this random forest model. The parameters are as follows:
    i. randomforestregressor__n_estimators: 69
    ii. simpleimputer__strategy: 'median'
    iii. standardscaler: None

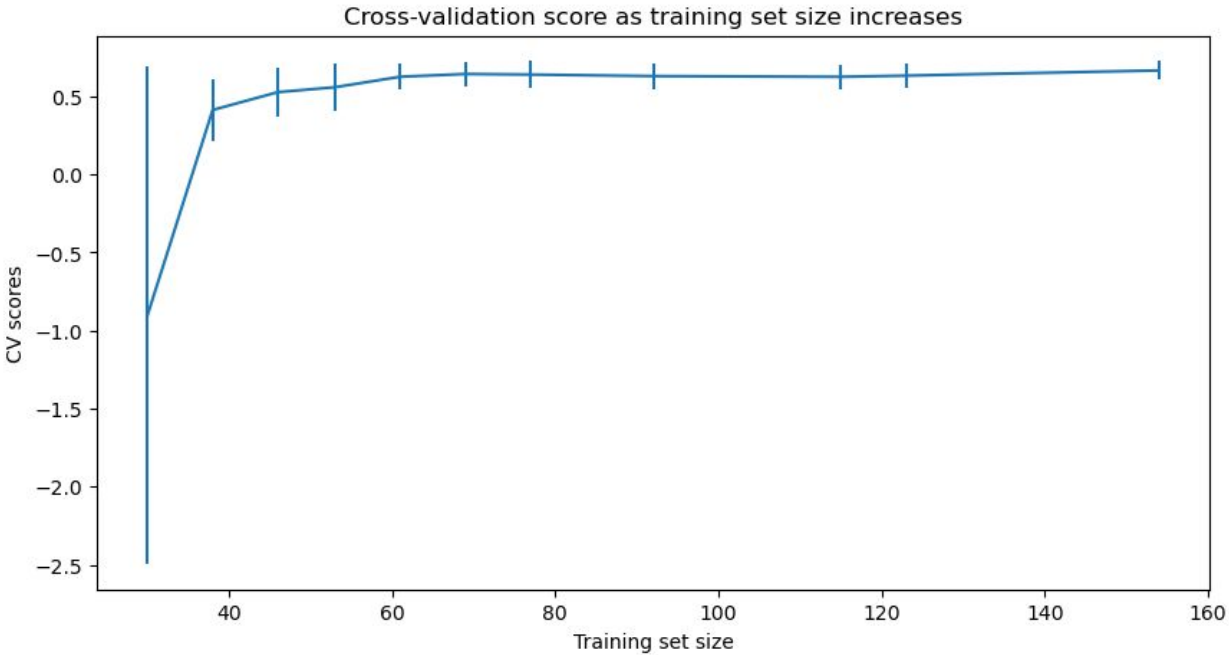
  - The random forest regressor determined the top 4 feature importances from the dataset to be: fastQuads, Runs, Snow Making_ac, and vertical_drop, which agree with the results of the linear model feature selection.

  - On the training set, the random forest model had a mean average error of $9.645 with a standard deviation of $1.353. On the test set, the random forest model had a mean average error of $9.538.

Modeling Results and Analysis (3/4)

Do we have enough data?

The results show that we seem to have plenty of data. Increasing from a fraction to our full training dataset, there's an initial rapid improvement in model scores as one would expect, but it's essentially leveled off by around a sample size of 40-50% percent of our training dataset.



Modeling Results and Analysis (4/4)

In response to the options that the business has shortlisted:

1. The model predicts:
    a. Closing 1 run makes no difference to ticket price.
    b. Closing 2 and 3 successively reduces support for ticket price by $0.41 and $0.67, respectively and therefore decreases business revenue by $710,145 and $1,166,667, respectively, assuming the resort continued to receive 350,000 ticket holders that purchased 5 tickets on average.
    c. If Big Mountain closes down 3 runs, it seems they may as well close down 4 or 5 as there's no further loss in ticket price.
    d. Increasing the closures down to 6 or more leads to a large drop in ticket price support.

2. Adding a run to a point 150 feet lower and installing an additional chair lift to bring skiers back up results in a predicted increase of support for ticket price by $1.99. Over the season, this could be expected to amount to $3,474,638, with the assumption that the resort continued to receive 350,000 visitors that purchase 5 tickets on average over the course of the season. However, this additional revenue does not take into account the cost of installing or operating an additional ski lift.

3. If the resort took the same actions as option 2, but also added 2 additional acres of snow making cover, then the model predicts no additional support for ticket price.

4. Lastly, if the resort increased the longest run by 0.2 miles to boast a new 3.5 mile longest run and added an additional snow making coverage of 4 acres, then the model also predicts no additional support for ticket price.

Summary and Conclusion

Taking a look at specifically Montana, Big Mountain Resort already has the highest priced adult weekend ticket in the state. If the public's response to a ticket price increase is of concern to the business leadership, a less aggressive price increase can be taken and a new study conducted to measure a change in business, if any.