

Big Mountain Resort Project Report

Abstract:

In this project, we explored the application of various regression algorithms to predict ticket prices for Big Mountain resort. We analyzed and preprocessed the dataset, selected relevant features, and implemented different regression models. The performance of each model is evaluated using metrics such as R-squared and Mean Absolute Error (MAE).

1. Introduction:

Problem Statement: Big Mountain Resort is a ski resort located in Montana. It offers access to 105 trails and every year about 350,000 people enjoy the ski and snowboarding services that the resort offers. The resort recently installed an additional chair lift that increased its operation costs by \$1,540,000 this season. Although the resort is charging a premium price compared to other resorts, Big Mountain has a greater potential to capitalize on its facilities.

Dataset: csv file

Objectives: Build a ticket price prediction model.

2. Data Wrangling:

Checked the percentage of missing values and outliers, removed irrelevant and useless features, selected adult weekend ticket price as the target variable.

3. Exploratory Data Analysis (EDA):

Principal Component Analysis (PCA) was used for dimensionality reduction

Features that were important to analyze: vertical drop, snow making area, number of total chairs, number of fast quads, number of runs, longest run length, number of trams, skiable area.

4. Pre-processing and Training Data:

Split train set and test set before training.

4.1 Linear Regression:

Implementation: created pipeline to impute values that were missing.

Assessment: cross validation with MAE and R-squared as metrics.

4.2 Random Forest Regressor:

Implementation: created pipeline to impute missing values

Assessment: cross validation with MAE and R-squared as metrics.

5. Results and Discussion:

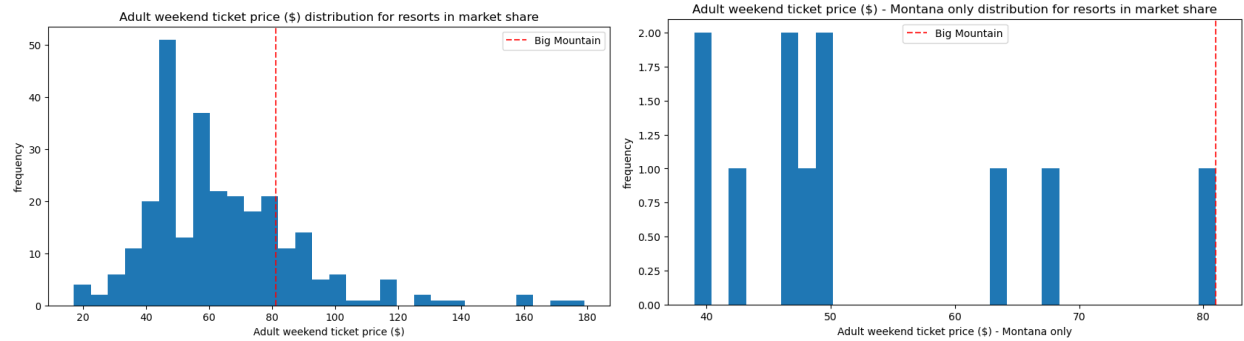
Selected Random Forest Regressor as it handles better overfitting.

Scenario Modelling:

1. Close up to 10 of the least used runs
2. Increase the vertical drop by adding a run to a point 150 feet lower down
3. Increase the vertical drop and adding 2 acres of snow making cover
4. Increase the longest run by 0.2 mile.

Visualization:

Big Mountain Ticket Price (ticket price distribution in US vs ticket price distribution in Montana)



6. Conclusion:

Currently, the weekend adult ticket price at Big Mountain resort is set at \$81. However, our model indicates that given the amenities of the resort, a more appropriate price would be \$95.87. Despite a Mean Absolute Error (MAE) of \$10.39, there is still potential for raising the ticket price. Demonstrating the average prices of other resorts offering similar facilities to Big Mountain could help justify this increase.

Regarding the new chair lift, it will raise the operational costs by 0.88%. This increase is entirely manageable according to our model's predictions.

Looking ahead at potential enhancements:

1. We propose shutting down the least utilized ski run, which is unlikely to affect overall revenue.
2. We suggest expanding the vertical drop by adding a new slope that descends an additional 150 feet