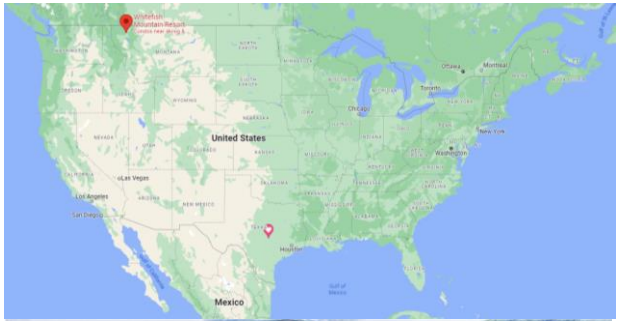
Problem to Solve

What is the Best Ticket Price for Big Mountain Resort?

Problem Identification

- Big Mountain Resort is a premium resort in Montana
  - Spectacular views of Glacier National Park
  - Amongst the resorts with the highest number of total chairs, one of the longest runs, the largest amount of skiable terrain, and high vertical drop
  - About 350,000 people visit every year
- What is the best value for the ticket price?
  - The resort recently installed an additional chair lift to help increase the visitors, which increases the operating cost by 1.55 million this season
  - The resort intends to increase the ticket price to cover the cost
    - If so, what is the better price?
    - Are there any other approaches such as cutting operating cost?

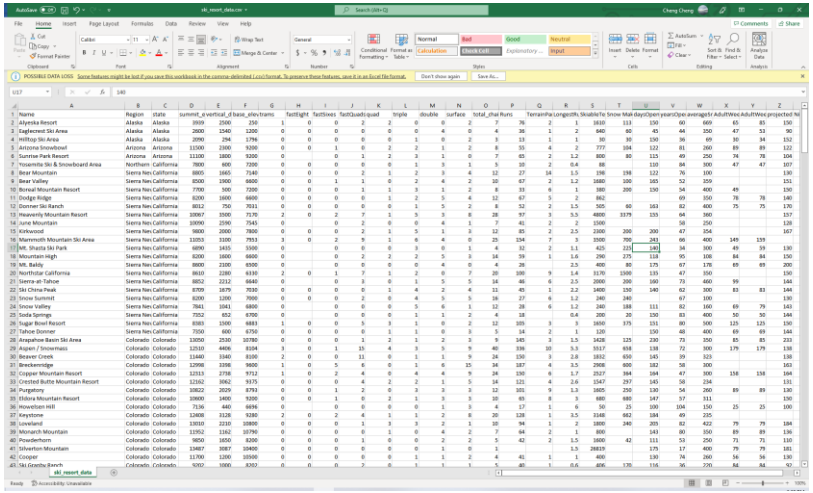


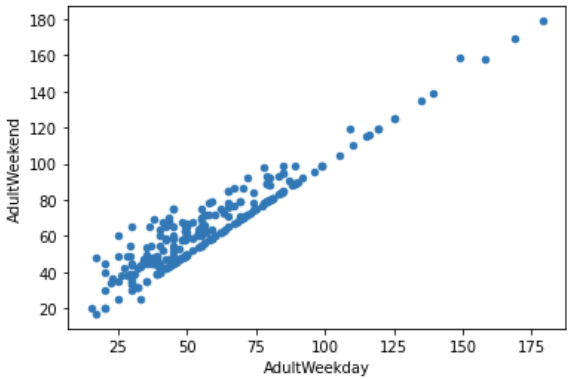
Recommendation and Key Findings

- FastQuads, total runs, snow making area, and vertical drop are the most important features which have significant impacts on the ticket price.
- The resort is undercharging currently based on the model results. The modelled ticket price is $96 whereas the current ticket price is $81.
- Findings from a few scenarios:
    - If the resort is adding a run, increasing the vertical drop by 150 ft, and installing an additional chair lift, then the ticket price is supported by $1.99.
    - In addition to the improvements above, if the resort is adding 2 acres of snow making, then the ticket price is supported by $1.99.
    - If the resort is increasing the longest run by 0.2 miles and adding 4 acres of snow making, it doesn't support any price increase.

Approach – Data Wrangling

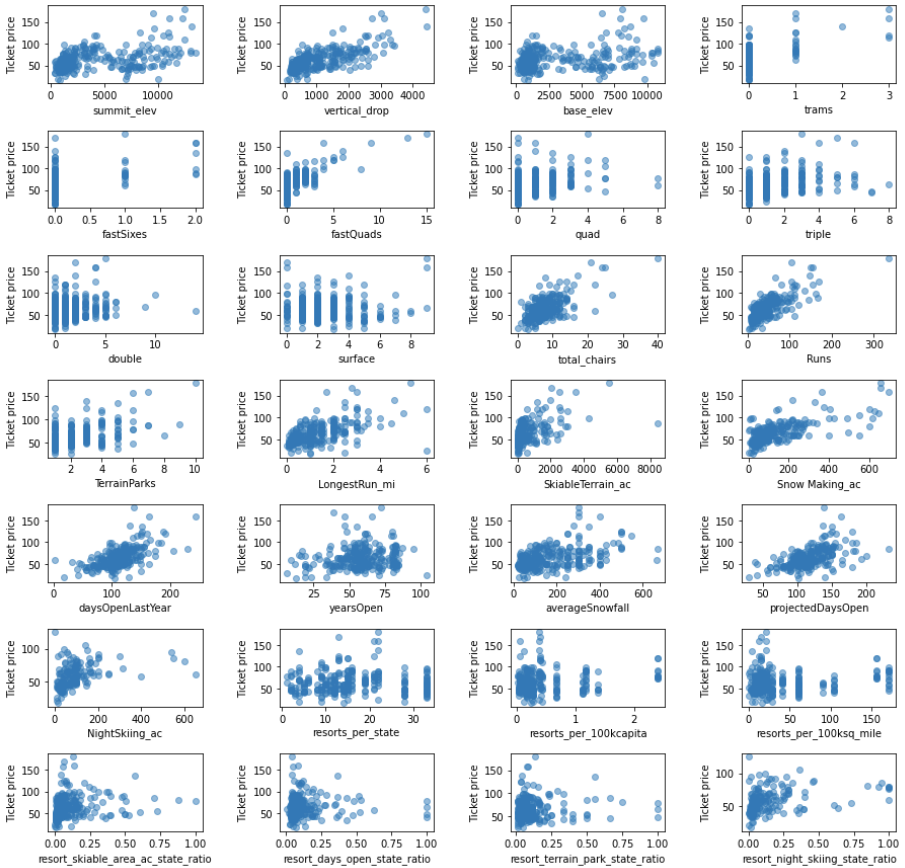
- The raw dataset has information of facility features, ticket price, resort open days, etc. from more than 300 ski resorts across the US, which are considered part of the same market share
- The raw dataset has missing and incorrect values for some features, so data wrangling is needed to clean and transform the data to be used in the subsequent analysis
- The target value is ‘adult weekend ticket price’ since the weekend ticket price is almost the same as the weekday ticket price
- The features includes vertical drop, snow making area, total runs, fastQuads, etc.





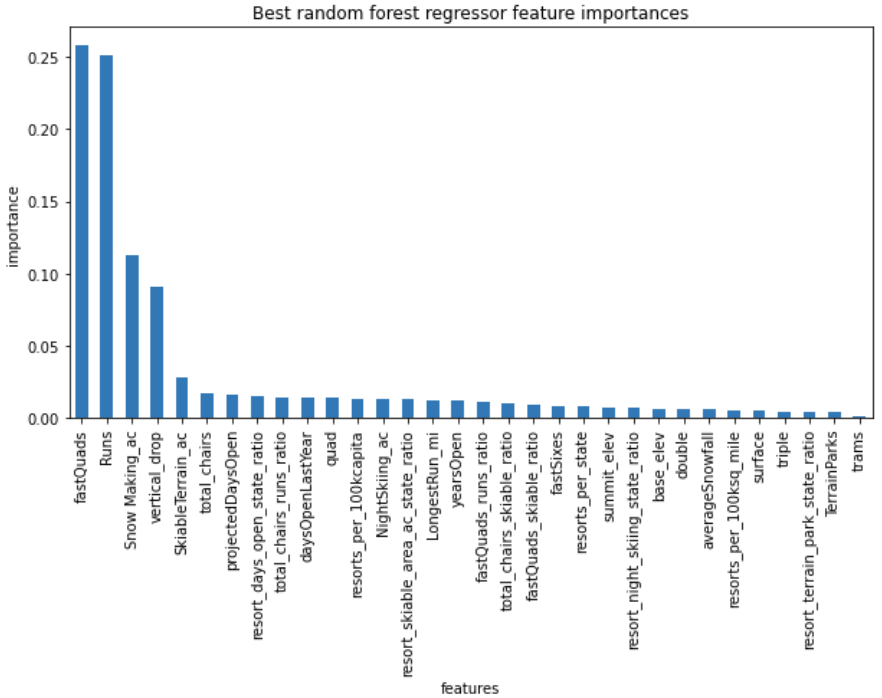
Approach – EDA

- EDA (exploratory data analysis) was conducted to explore the state data, and PCA (principal components analysis) was applied to determine if there is a relationship between state and ticket price
  - No clear relationship was found
  - We can use data from all states in the modeling
- Through preliminary analysis, the ticket price has noticeable correlations with fastQuads, total runs, snow making area, total chairs, vertical drop



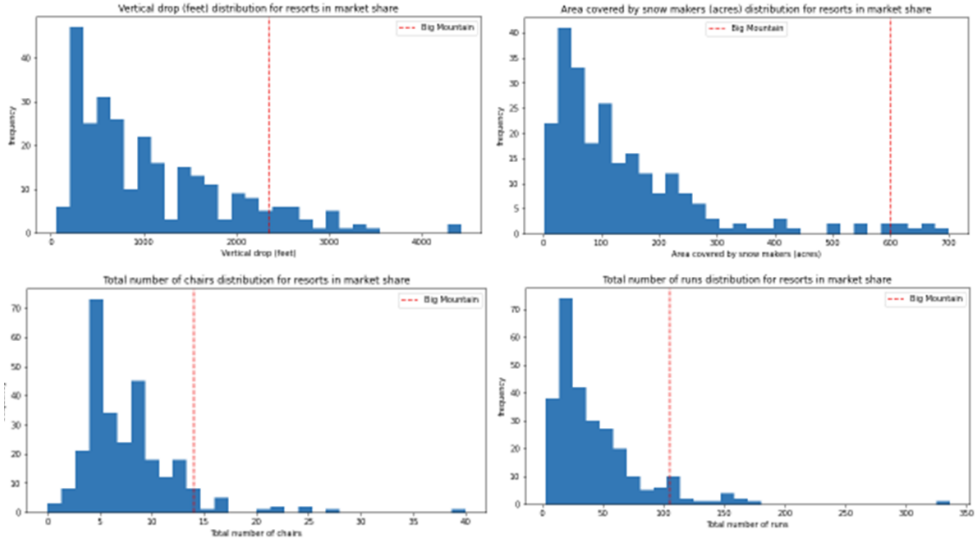
Approach – Training Data

- Linear regression model
  - Split the dataset into train and test splits
  - Use pipeline from sklearn on the train split and apply to the test split for assessment
  - Use SelectKBest from sklearn with F-regression to refine the model, with the help of cross-validation
- Random forest model
  - Fit and assess the performance using cross-validation
  - Has lower cross-validation mean absolute error and less variability compared to linear model
- Both models result in similar features that are important to the ticket price



Approach –Modeling

- Modelled ticket price
  - Refit the model with all available data (except Big Mountain data) using the random forest model in the previous step
  - The modelled price is $96 whereas the current price is $81
  - The resort is fairly high on vertical drop, snow making area, total chairs, fastQuads, total runs, etc.; therefore, these important features do provide support for the ticket price increase.
- Model Scenarios
  - Conduct sensitivity scenarios to explore the impacts on the ticket price increase support with either cutting operating cost or improving some facilities



Summary and Conclusions

- Modeling Process
  - Data wrangling
  - EDA
  - Pre-processing and training data
  - Modeling – linear model & random forest model
- Results show:
  - FastQuads, total runs, snow making area, and vertical drop are the most important features which have significant impacts on the ticket price, which the Big Mountain resort have high values on these features.
  - The resort can potentially increase the ticket price from $81 currently to $96 according to model prediction.
  - Additional improvements to the facilities or cutting operating costs can be simulated to determine the ticket price change
  - This study has limitations
    - We only considered ticket price. There are other areas to increase the revenue.
    - We were only provided with the operating cost for the additional chair lift. Other operating costs are needed for the full-scale data analysis and modeling.