PRICE MODELING FOR BIG MOUNTAIN RESORT'S TICKET PRICE

PROBLEM STATEMENT

PROBLEM STATEMENT

- Big Mountain has installed a new chairlift
- Operational cost of the new chairlift= $1.54M
- Find a pricing model to find the best value for Big Mountain Resort's ticket price
- Increase the revenue by at least $1.54M to compensate for the additional operating cost
- Timeframe: less than one year

PRICING RECOMMENDATION

- Add a run, increase the vertical drop by 150 ft, and install an additional chair lift.
- Increase price per ticket by $1.99.
- Potentially an additional of about $3.5M in revenue.
- Estimated operational cost of the newly installed chairlift ~ $1.5M
- Adding another chairlift will double the operating cost ~ $3M
- There will be about $0.5M increase in revenue at the end.

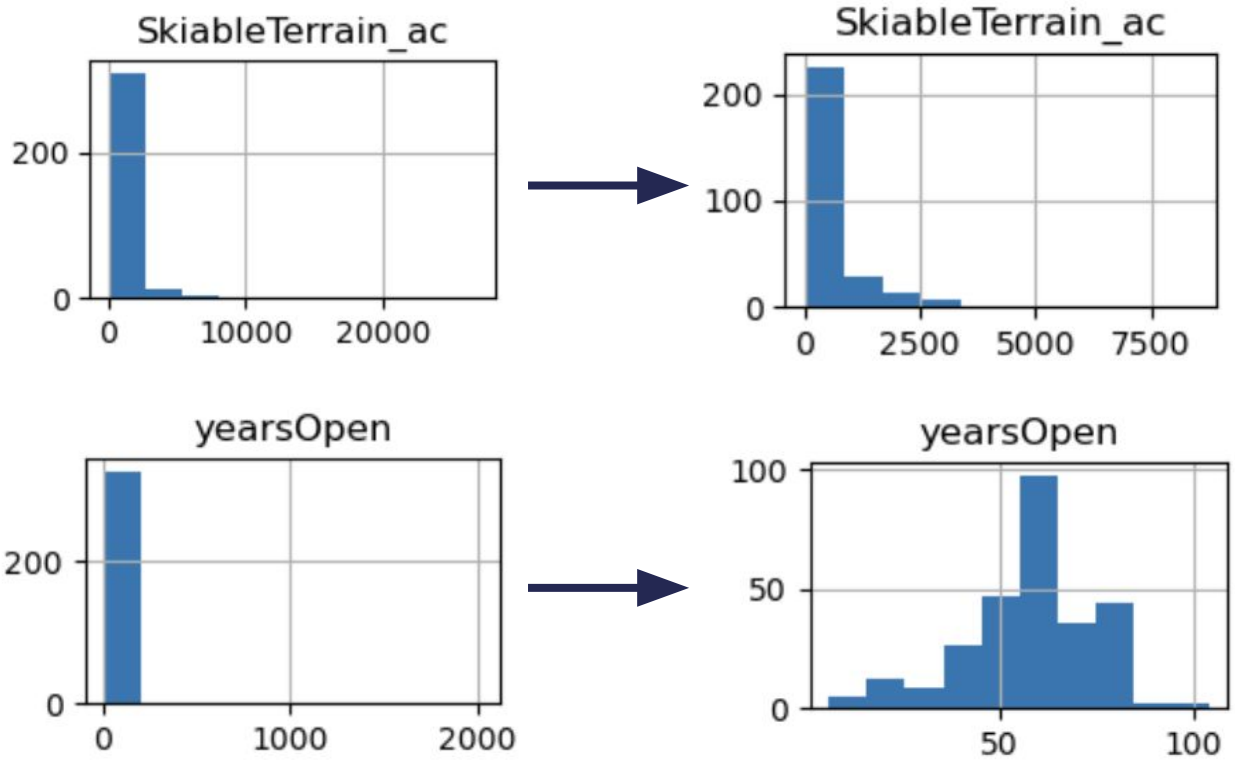
DATA WRANGLING

DATA WRANGLING

- Two types of ticket price were found:
  - adult weekday price
  - adult weekend price
- Resorts' missing values:
  - 82% - no missing price information
  - 3% - missing one value
  - 14% - missing both price values
    - dropped from the dataframe
- Example of suspicious values:
  - SkiableTerrain- ac
    - One resort had a very large value which was replaced with the correct number obtained and verified through online search
  - YearsOpen
    - A resort reported that it has been open for 2019 years. It was dropped from the dataframe

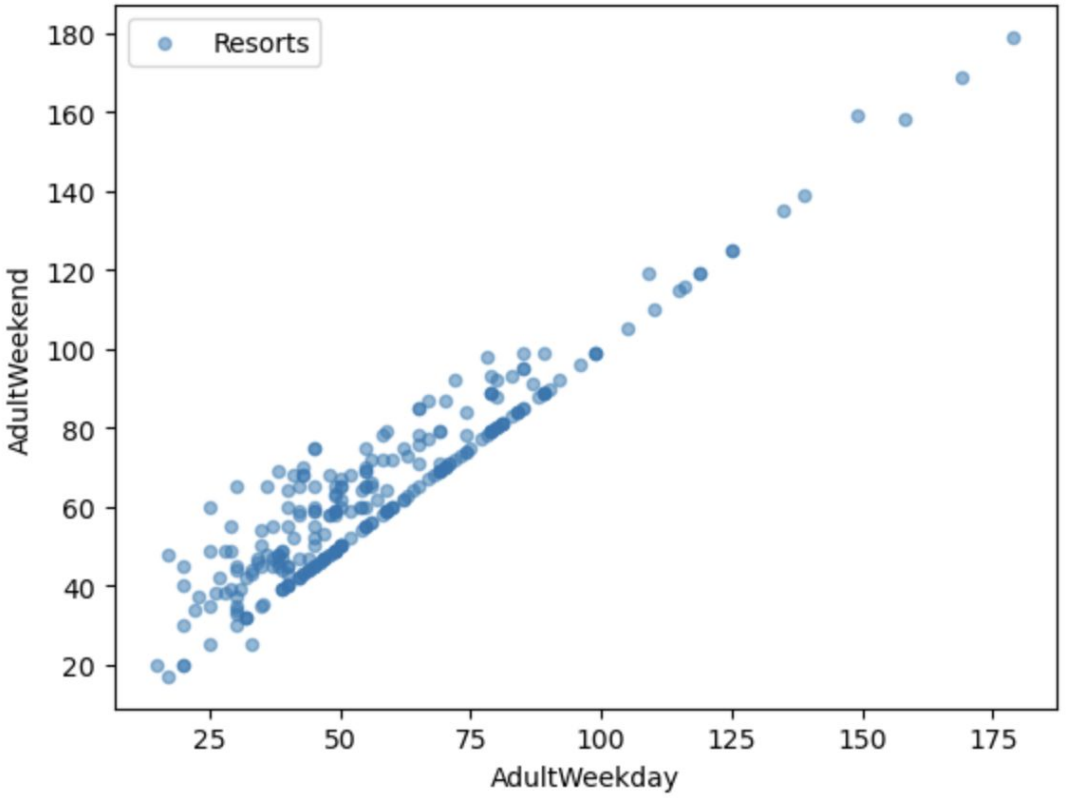
Before Data Cleaning

After Data Cleaning



DATA WRANGLING

- Key Takeaways:
  - Once the weekday price approached $100 from below, weekend and weekday prices were typically the same.
  - The current weekday and weekend prices for Big Mountain resort were seen to be equal, at $81.
  - The equality between weekend and weekday prices was seen for all resorts in Montana.
  - There were a few more weekend prices than weekday prices in the dataset:
    - weekday prices were dropped
    - weekend prices were chosen as the target ticket price

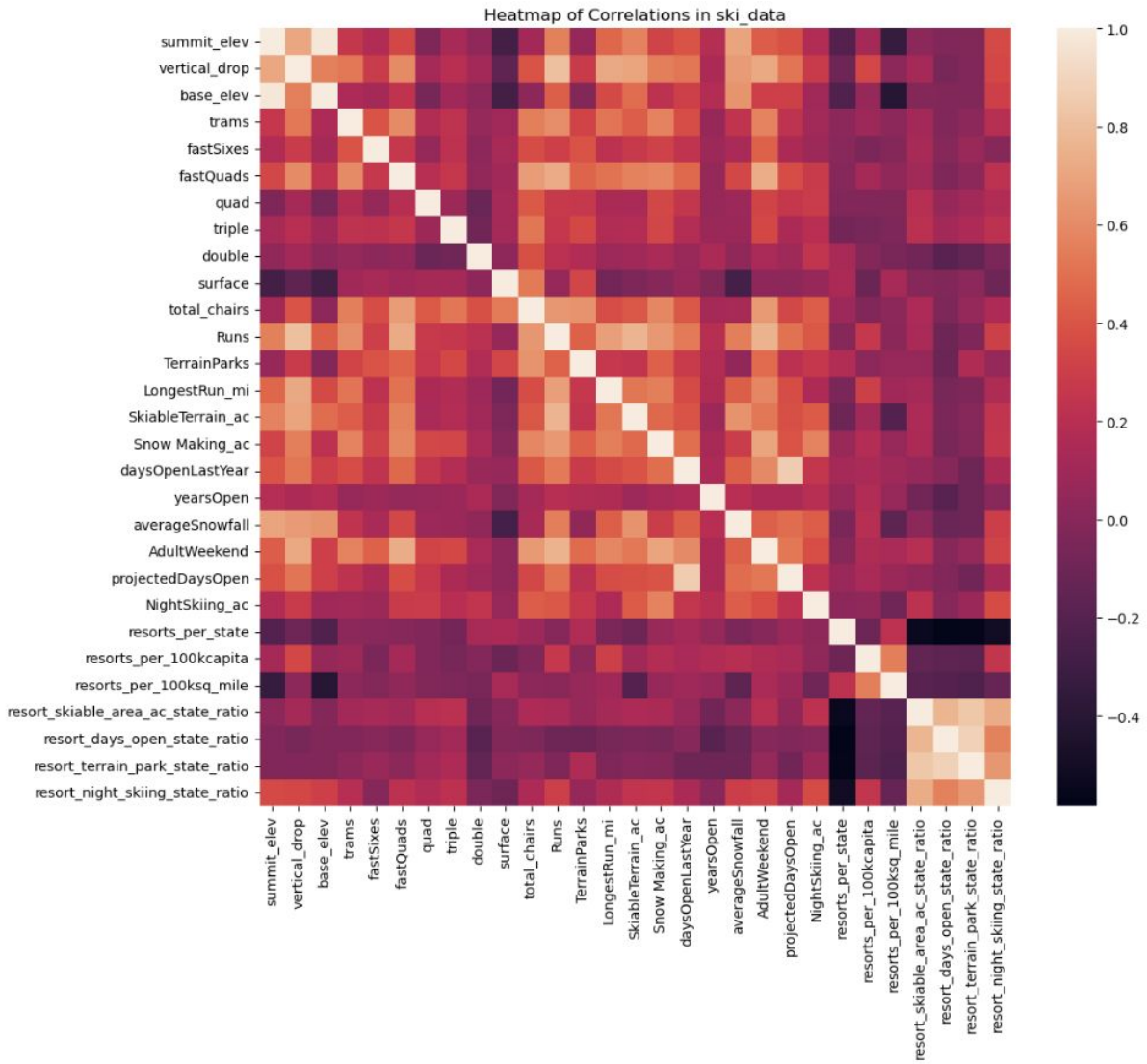


EXPLORATORY DATA ANALYSIS

EXPLORATORY DATA ANALYSIS

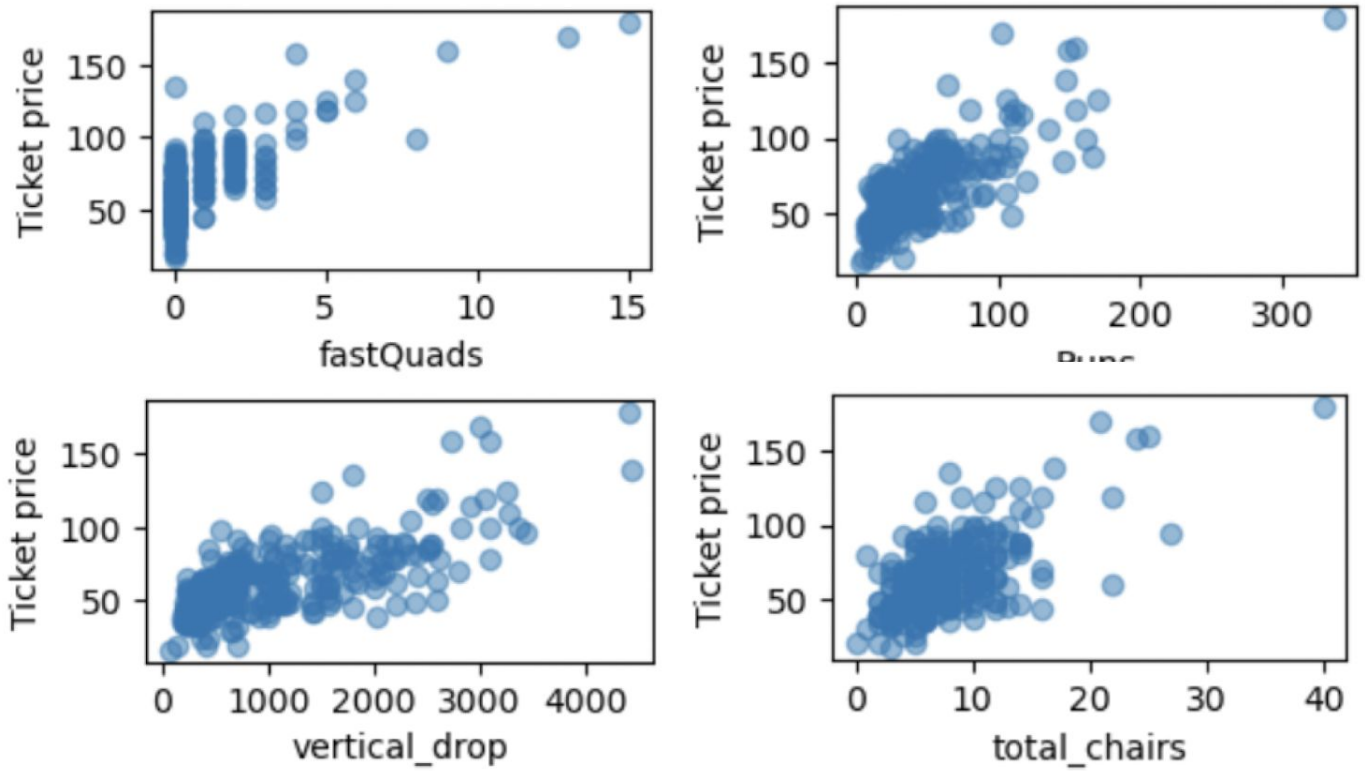
- Principal Component Analysis (PCA)
  - No clear pattern suggestive of a relationship between state and ticket price
  - Outlier states:
    - Vermont, New Hampshire, New York, and California

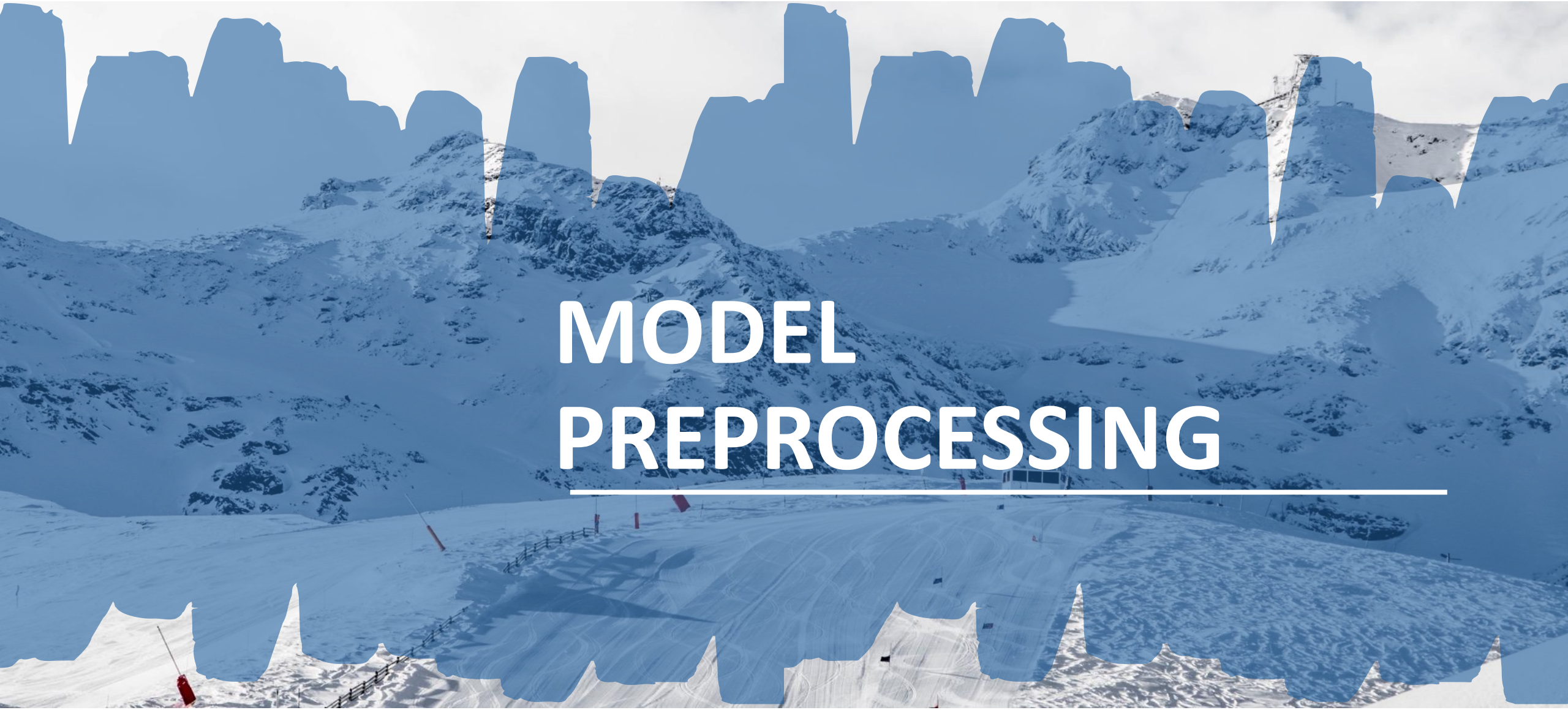
- Seaborn correlation heatmap
  - Most important features:
    - FastQuads
    - Runs
    - Vertical Drop
    - Total Chairs
  - Secondary important features:
    - Longest Run
    - Skiable Acres
    - Snowmaking Acres



EXPLORATORY DATA ANALYSIS

- Features used in modeling
  - FastQuads
    - captures both snow making acres and night skiing
  - Runs
    - Similar to Skiable Acres
  - Vertical Drop
    - Captures longest run
  - Total Chairs

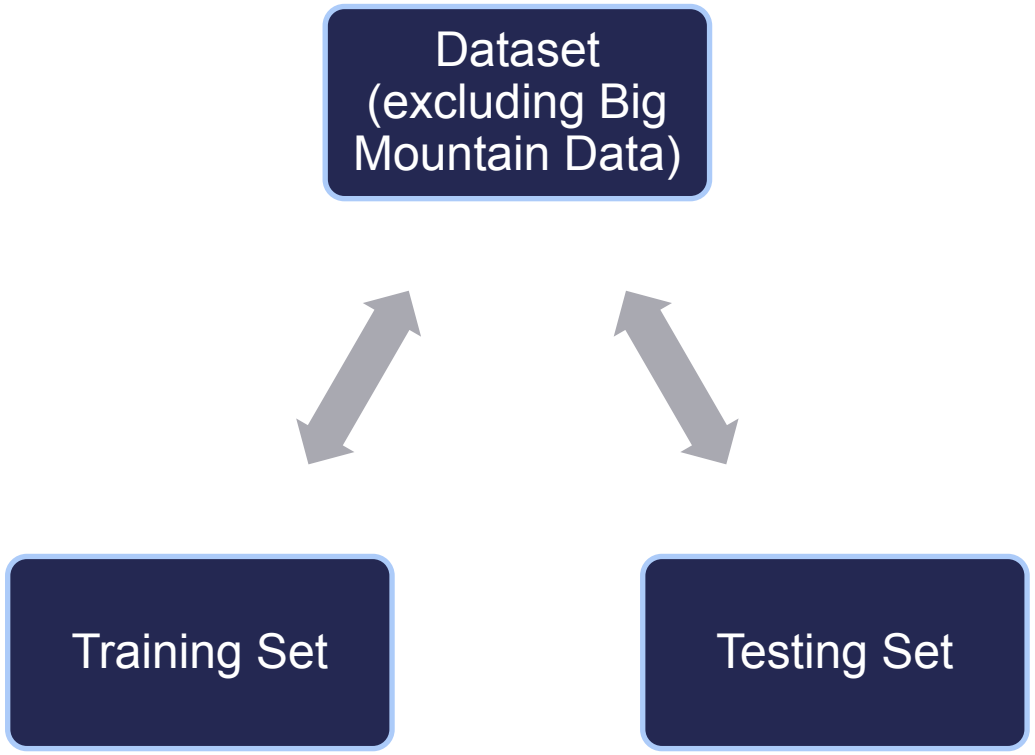




MODEL PREPROCESSING

MODEL PREPROCESSING

- Imputing
  - Imputing the missing values using either the mean or the median did not seem to significantly change the results.
- Algorithms
  - Linear Model
  - Random Forest Model
- Measure of Errors:
  - R-squared
  - Mean Absolute Error (MAE)



MODEL PREPROCESSING

Linear Regression Model

- Dominant top four features:
  - vertical_drop, Snow Making_ac, total chairs, fastQuads
- MAE on the test set ~ 11.79
- std on the test set ~ 1.62
- MAE for CV ~ 10.50

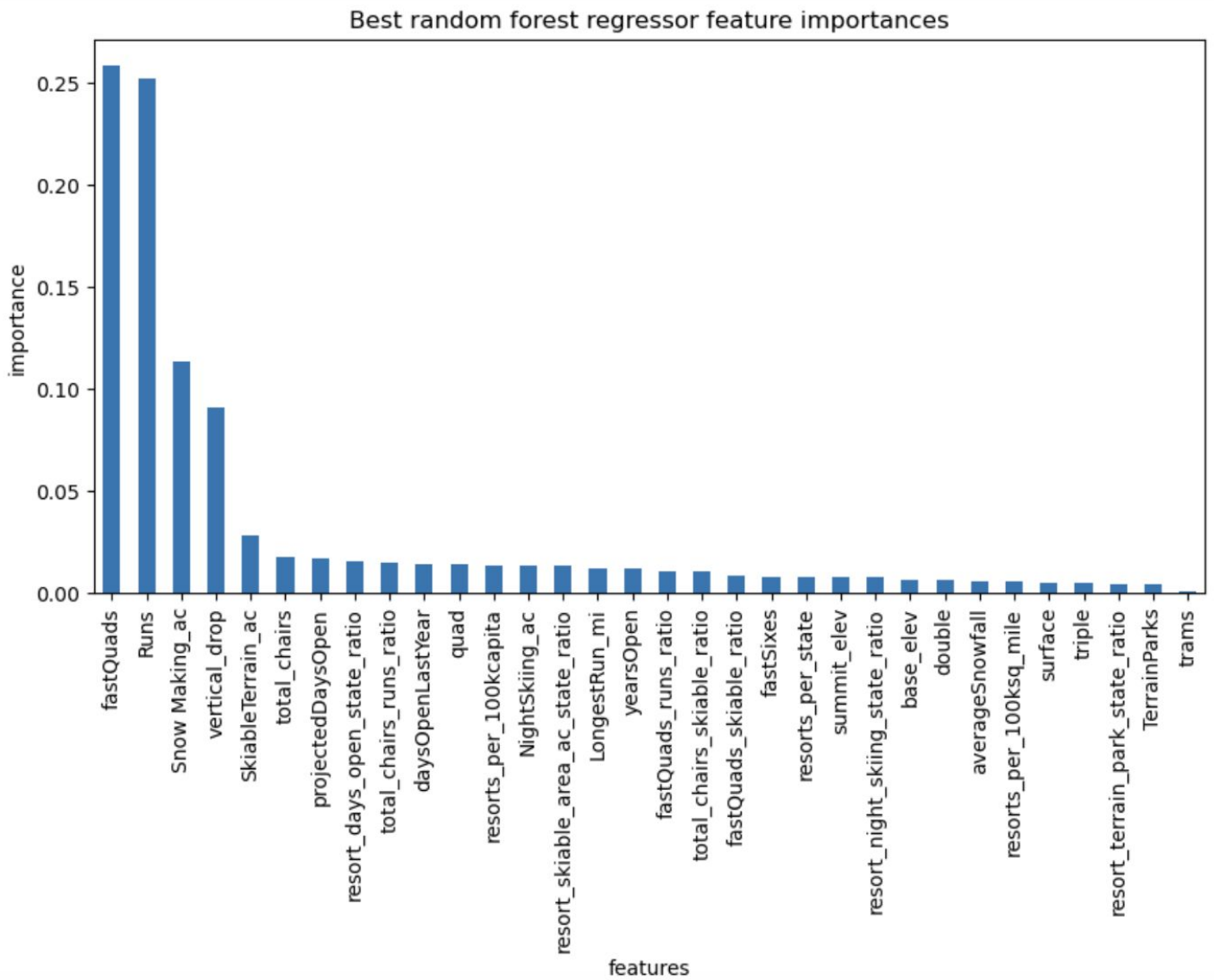
Random Forest Model

- Dominant top four features:
  - fastQuads, Runs, Snow Making_ac, vertical_drop.
- MAE on the test set ~ 9.53
- std on the test set ~ 1.35
- MAE for CV ~ 9.64

RECOMMENDED MODEL

- Random Forrest Model
  - mean absolute errors had a lower standard deviation.
  - MAE on the test set was within less than one standard deviation from the mean of the cross validation MAEs
  - consistently producing a noticeably lower mean absolute error than the linear regression model.

- Dominant top four features:
  - fastQuads
  - Runs
  - Snow Making_ac
  - vertical_drop.



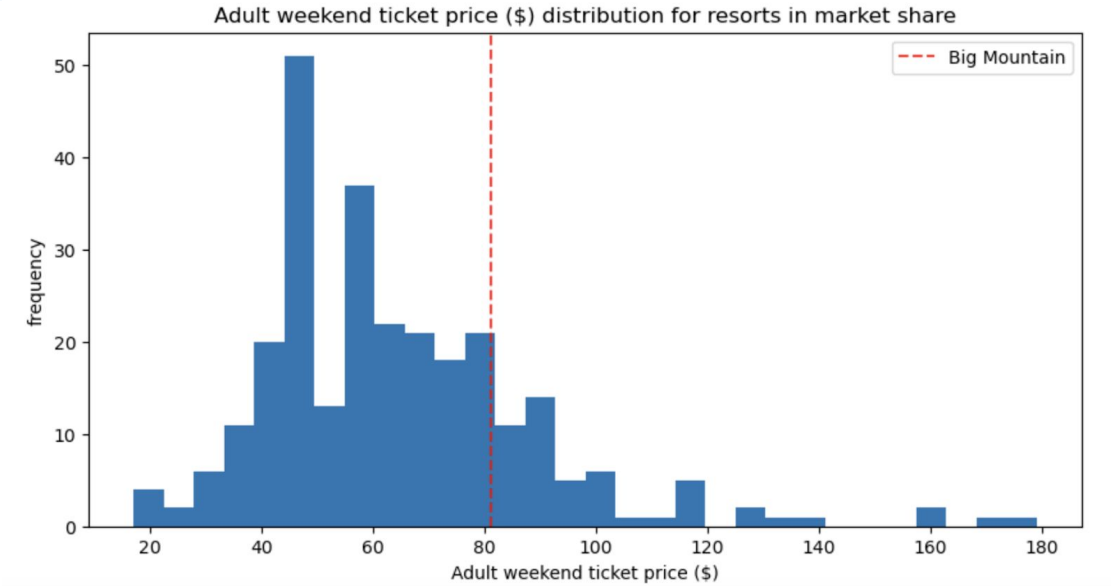
RESULTS OF MODELING

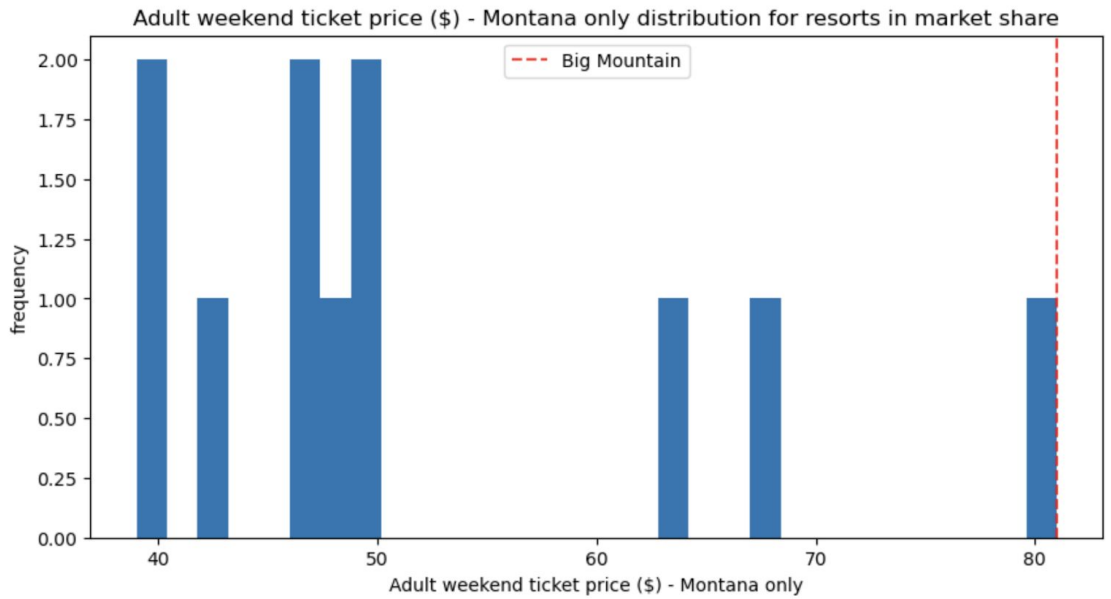
- Big Mountain
  - Modeled Price= $95.87
  - Actual Price= $81.00

- Overall Big Mountain is charging more than many of the other resorts but there are quite a few resorts with higher ticket prices.

- Among the other resorts in Montana, Big Mountain is charging at the upper end of the ticket prices with $81 per ticket.

- Modeling Assumptions:
  - 350,000 visitors per season
  - 5 tickets per visitor





MODELING SCENARIOS

1. Permanently close up to 10 of the least used runs.

- closing one run makes no difference.
- closing 2 and 3 runs reduces support for ticket price and revenue.
- from 3 runs to 5 runs there is no further loss in ticket price or revenue.
- closing more than 5 runs will drastically reduce the ticket price and revenue.

2. Adding a run, increasing the vertical drop by 150 ft, and installing an additional chair lift.

- increases support for ticket price by $1.99.
- up to approximately $3.5 M increase in revenue.

3. Adding a run, increasing the vertical drop by 150 ft, installing an additional chair lift, and adding 2 acres of snow making

- not a significant difference compared to Scenario 2
- increase support for ticket price by $1.99.

4. Increases the longest run by 0.2 miles and guaranteeing its snow coverage by adding 4 acres of snow making capabilities

- no increase in the support for ticket price as all.

PRICING RECOMMENDATION

- Take a closer look at Scenario 2
- Add a run, increase the vertical drop by 150 ft, and install an additional chair lift.
- Increase price per ticket by $1.99.
- Potentially an additional of about $3.5M in revenue.
- Estimated operational cost of the newly installed chairlift ~ $1.5M
- Adding another chairlift will double the operating cost ~ $3M
- There will be about $0.5M increase in revenue at the end.

THANK YOU