Problem Statement

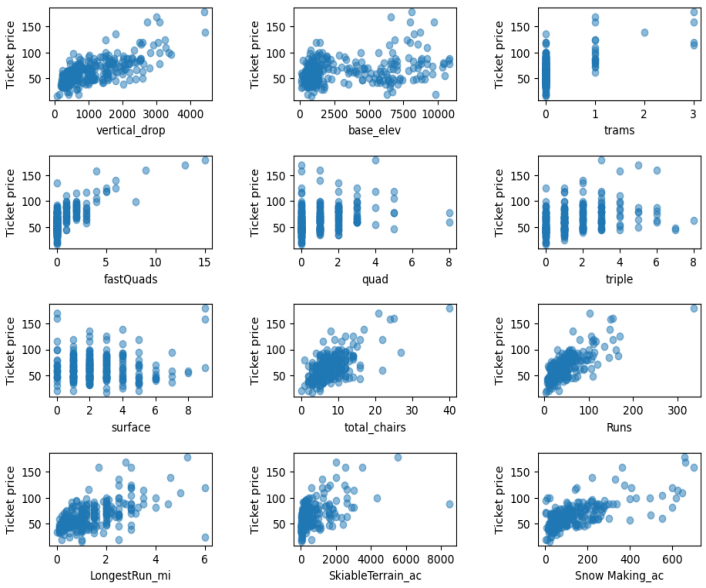
How can Big Mountain Ski Resort re-price their tickets based on the importance of its facilities (such as No. of Runs, Skiable Terrain, No. of Terrain Parks, etc.) such that the increase of $1,540,000 in operating cost is recouped within one year?

Data Wrangling

- 'AdultWeekend' was considered as the Target Feature.
- Rows which were missing 'AdultWeekday' and 'AdultWeekend' prices were removed.
- The distribution of numeric data was considered to remove any outliers.
- State statistics were imported from wikipedia.

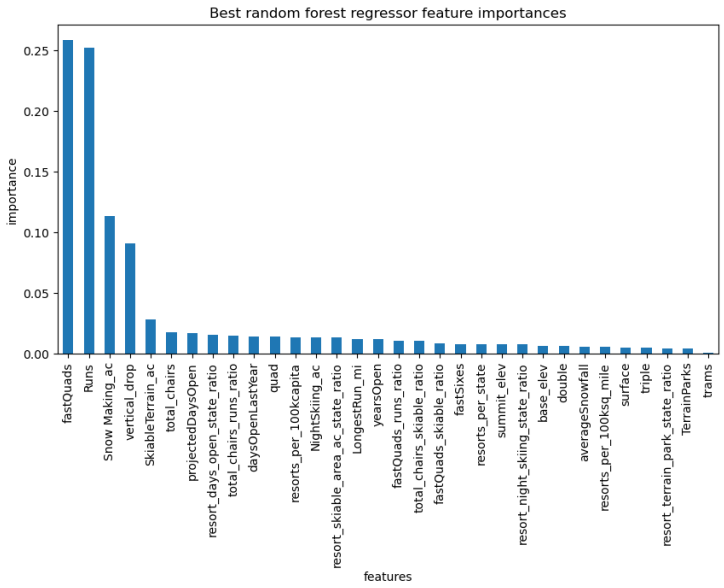
Exploratory Data Analysis

- Using PCA, found ‘resorts_per_100kcapita’ and ‘resorts_per_100ksq_mile’ had strong positive components with PC2.
- Defined the ratios of skiable area, terrain parks, night skiing area as proportions of the state totals for each of these features.
- ‘fastQuads’, ‘Runs’, ’Snow Making_ac’, ‘total_chairs’, ‘total_drop’ were seen to be highly correlated to ticket price.



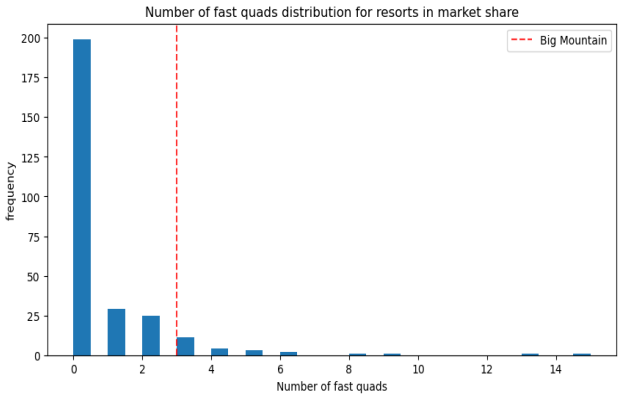
Preprocessing and Training

- Training results for Linear regression: cv_score mean = 0.633, cv_score std = 0.095.
- Test results for Linear regression: MAE = 11.79.
- Training results for Random forest: cv_score mean = 0.698, cv_score std = 0.071.
- Test results for Random forest: MAE = 9.54.
- Random forest model has a lower cross-validation mean absolute error by almost $1.



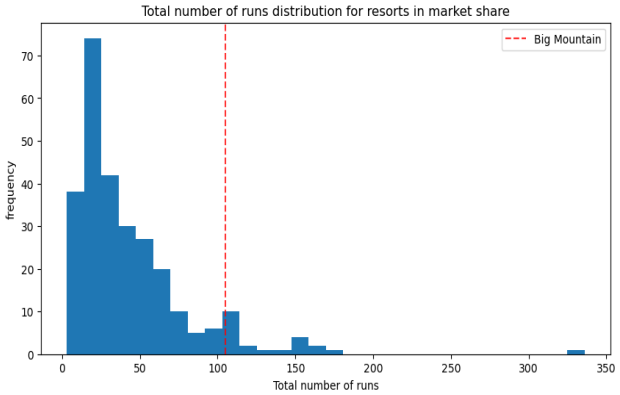
Verifying performance on the test set produces performance consistent with the cross-validation results.

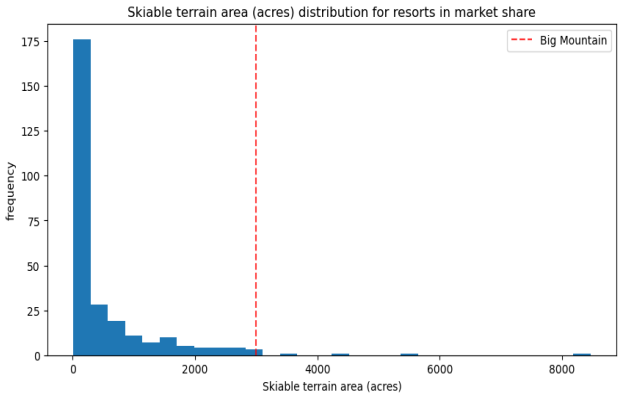
- Most important features: ‘fastQuads’, ‘Runs’, ‘Snow Making_ac’. This is in line with what was expected from EDA.



Modeling

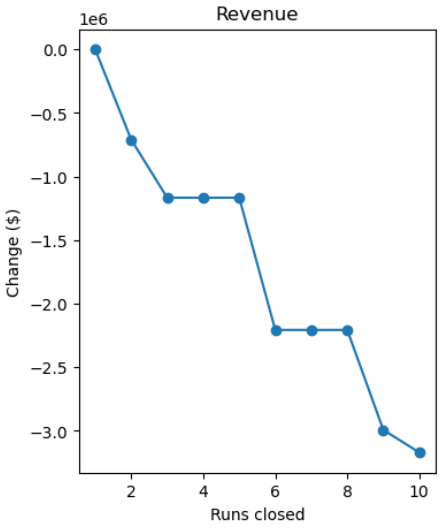
- Current ticket price (CTP): $81.00.
- Predicted ticket price (PTP): $95.87, MAE = $10.39.
- Big Mountain Resort is in the upper echelon for all important features. This explains the higher PTP.
- Assumptions: 350,000 yearly visitors, expected 5 tickets per visitor.
- Recommended ticket price increase of at least $4.87 to be within the MAE of the PTP. Leads to a $8,522,500 increase in revenue over 1 year.
- Recommended scenarios as modeled:
    - Closing 1 run: no decrease in revenue (see figure for further closure of runs).
    - Adding 1 run, 150 ft in vertical drop, 1 chair: $1.99 increase in ticket price. Leads to $3,474,639 increase in yearly revenue.





Conclusion

- Recommended ticket price increase of $4.87.
- Adding 1 run, 150 ft in vertical drop, 1 chair would lead to a recommended $1.99 increase in ticket price.
- Closing 1 run would have no effect on revenue.



Further Work

- Include the yearly operating costs for each feature.
- Include yearly number of visitors for Big Mountain Resort.
- Include yearly weather data by state.