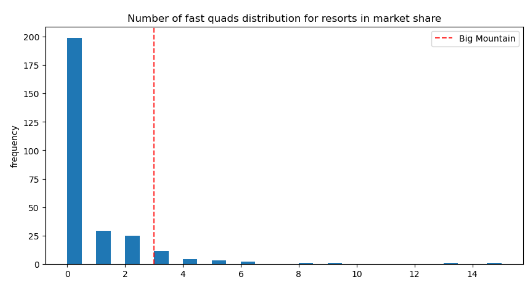
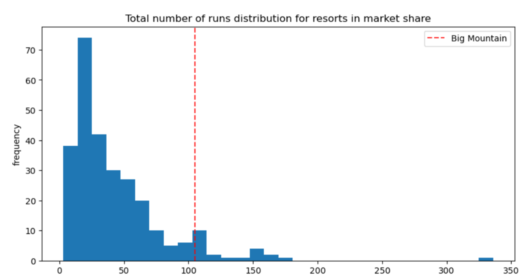
At present Big Mountain Resort contains 3000 acres of skiable terrain, with a vertical drop of 2353 ft, 105 runs, 14 chair lift, and charges $81 for an Adultweekend day pass. The purpose of this study was to analyze comparable resorts from around the country to determine if the set price for each adult ticket was suitable to maximize the revenue for the resort. Based on my analysis the original set price was found to be low and could be raised to $95 with a mean absolute error of $10.

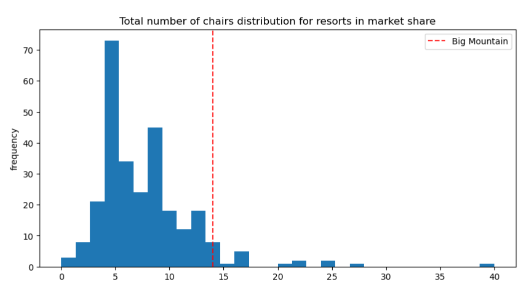
To begin, the data provided was cleaned and preprocessed to determine if there were any gaps in the data and convert it to a dataframe that could be used for future analysis. After completion one of my first tasks was to determine if there any significance to pricing differences between adult weekday tickets and adult weekend tickets. Finding that the differences between weekday and weekend tickets was not a significant factor I dropped the weekday pricing and continued with my analysis focusing solely on optimizing the weekend ticket price due to increased omissions of weekday prices.

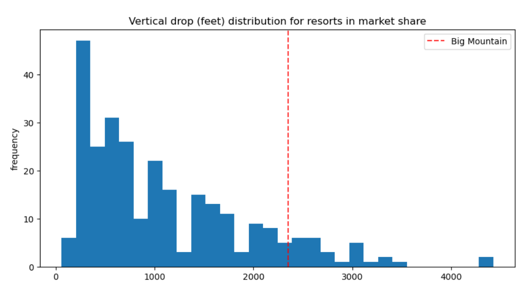
After some exploratory data analysis, I was able to identify several numerical and categorical features that seemed to have a key relation to setting an appropriate weekend ticket price for each resort. Those key factors are as follows: number of fast quads, total number of runs, area of snow making ability, and length of vertical drop. With these key factors in mind I moved on to building a model to determine an appropriate price for a ticket based upon the existing facilities in place at Big Mountain Resort. To build this model I first created a baseline to compare against, this baseline modeled a suggested price based on the computed mean of the training set and produced a mean absolute error of around $19. I then created and validated a linear regression model which produced a mean absolute error of around $12, followed by a random forest model which produced a mean absolute error of around $10. Leading to the conclusion that the random forest model would produce the most accurate results for our task at hand and should be utilized for any further analysis.

Utilizing the random forest model previously discussed I was able to model a suggested ticket price of $95 for Big Mountain Resort based on its current facilities. To further back this finding I analyzed the relationship between Big Mountain Resort and the key facilities listed above and noted that as expected of such an increase in suggested ticket price, Big Mountain placed extremely high in all key features as shown by the graphs below.

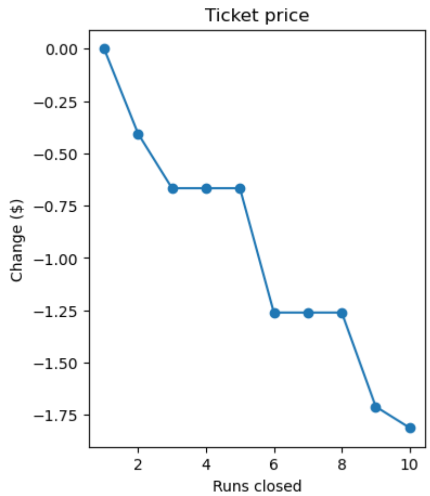


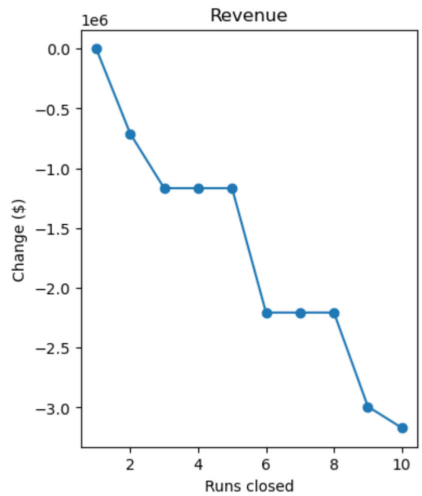






Lastly, I was able to utilize this model and make predictions based on the request scenarios finding that the largest increase in modeled price is in association with an increase in vertical drop length followed by an increase in the total number of chair lifts. Working through scenario 1 it was discovered that a decrease in the number of runs decreased the ticket price in groups rather than a linear amount. Meaning that closing one run had no effect on ticket price, while closing between 3 and 5 had the same effect on the price. This relation has been illustrated in the graphs ticket price and revenue shown below.





For scenarios 2 through 4 as discussed previously, the rankings of significance for each facility has been formulated for the predictive model and modeling these scenarios proved to have consistent findings with this order of significance. The largest increase in ticket price was found in scenario 2, with a projected increase of $8.61. While the increase of snow making area presented in scenario 3/4 and the addition to the longest run in scenario 4 had little to no effect. Leading to the overall recommendation for future improvements as the addition of 150 feet to the vertical drop with the additional chair lift. Furthermore, based on the findings of scenario 1, I isolated the addition of runs in scenario 2 and found no effect as a result of the increase. As such, I would suggest combining scenarios 1 and 2; closing between 4 and 5 runs to reduce operational costs while increasing the vertical drop and number of chair lifts to increase the ticket price. The number of runs to drop can be optimized by determining the operational cost associated with maintaining each run and comparing that to the loss in revenue shown with each closure. Based on our predictive model the recommended change would increase our ticket price by roughly 8 dollars and reduce our operating cost by the number of runs closed, thereby maximizing profit.