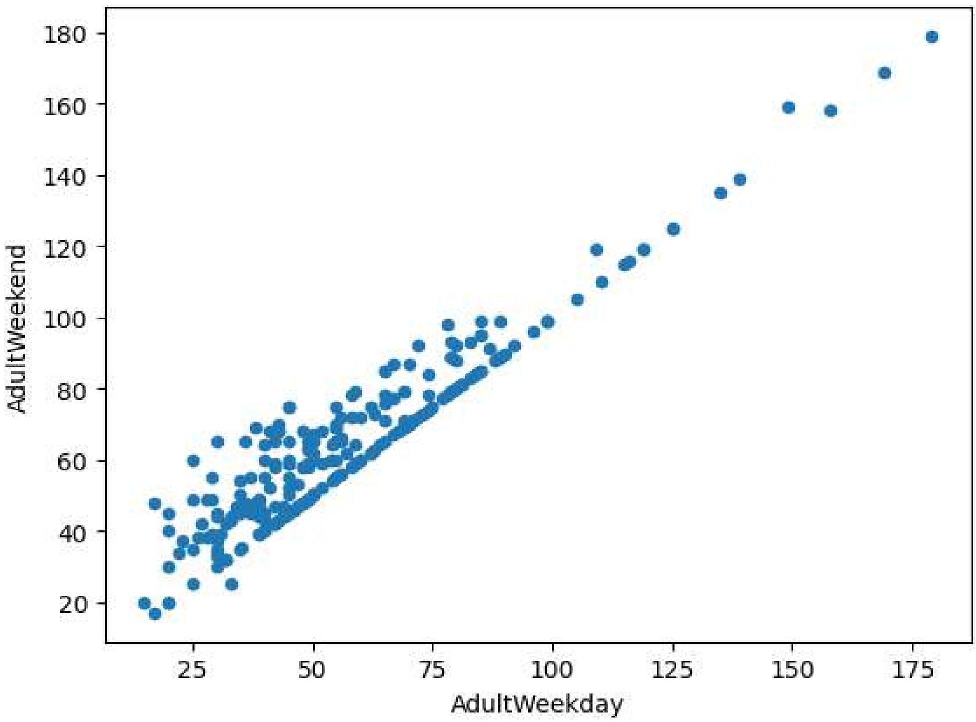
Guided Capstone Project Report

Problem Statement:

Big Mountain Resort, situated in Montana, is a well-known skiing destination that offers breathtaking views and a variety of ski slopes. However, the recent installation of a new chair lift has resulted in an increase in operating costs by $1.54 million for the season. As a result, the resort now needs a new pricing strategy that accurately reflects the value of its facilities while remaining competitive in the market. The main challenge faced by the resort is to develop a data-driven pricing model that takes into account the amenities and offerings of the resort, as well as the pricing data of other ski resorts across the country. The ultimate objective is to determine a price that is both competitive for customers and accurately reflects the value provided by Big Mountain Resort.

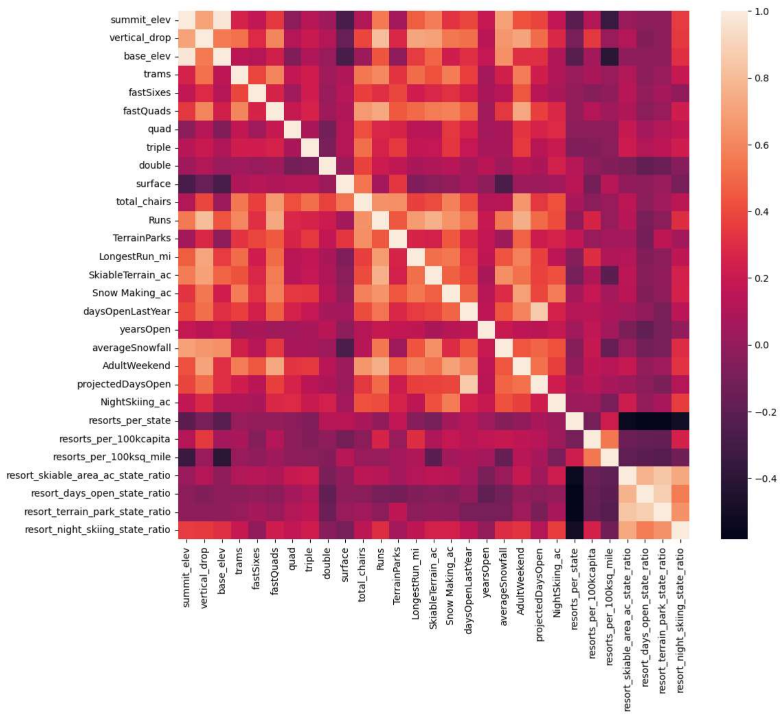
Data Wrangling:

The analysis was conducted using a dataset that included key variables. The initial step was to remove irrelevant columns and address any missing values. The focus of the analysis was to establish the relationship between AdultWeekend and AdultWeekday prices. It was discovered that most resorts had similar prices, except for Montana. As a result, the AdultWeekday column was dropped from further analysis. Additionally, the fastEight column was removed due to the significant number of null values and mostly 0 values. Apart from these two columns, some other columns were also dropped, and missing values were addressed.



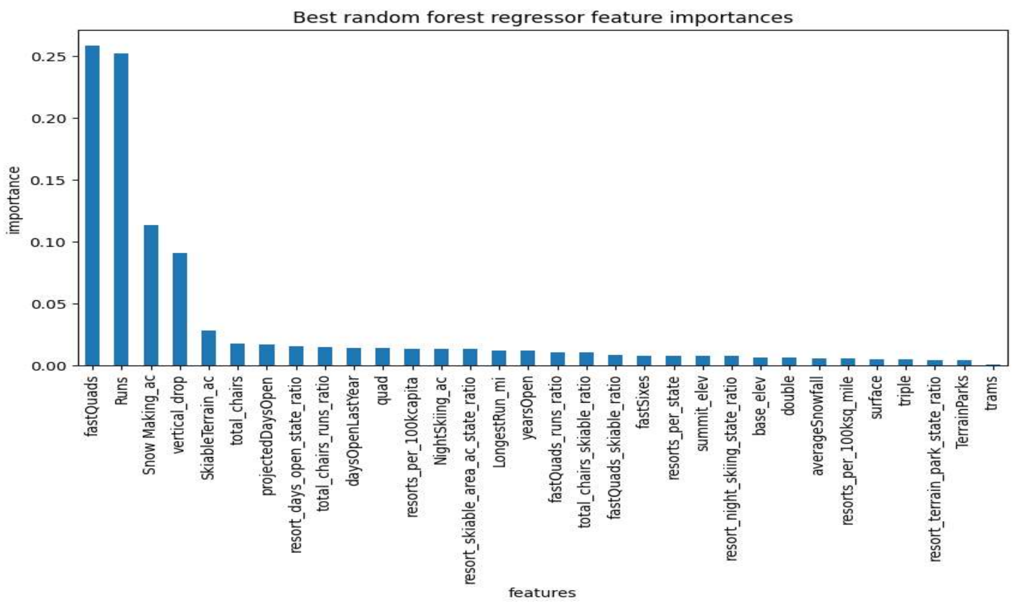
Exploratory data Analysis:

Constructed some potentially useful and relevant features, some states are higher in some but not in others. Some features will also be more correlated with one another than others. By using PCA (principle components analysis) method and creating a heatmap to visualize the connections among the features in the dataset. Particularly viewing them together by creating a series of scatterplots to find how ticket price correlated with other numeric features and probably ticket price is strongly correlated with resort night skiing along with fastQuads, Runs, vertical_drop, chairs, runs, and snowmaking coverage, and After analyzing the scatterplots, it is evident that the ticket prices are driven by these factors hence these are features to consider for further modeling.



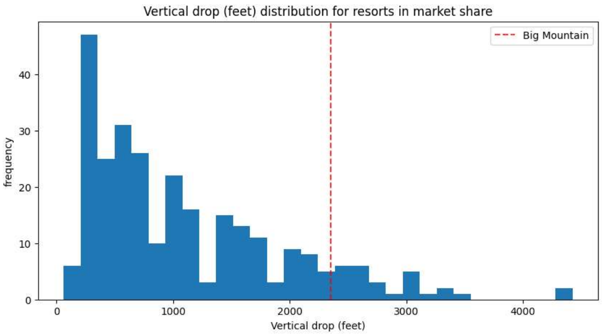
Model Preprocessing with Feature Engineering:

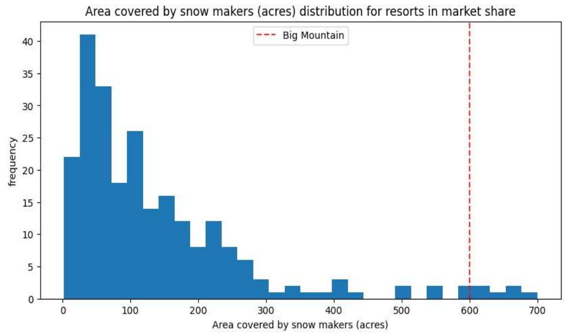
In order to come up with a new pricing plan, we utilized various regression models. We started with a baseline pricing calculated using the mean, then used the median to reduce the mean absolute error. We also incorporated a Random Forest Model and factored in the vertical drop, which led to even better accuracy and a lower mean absolute error.

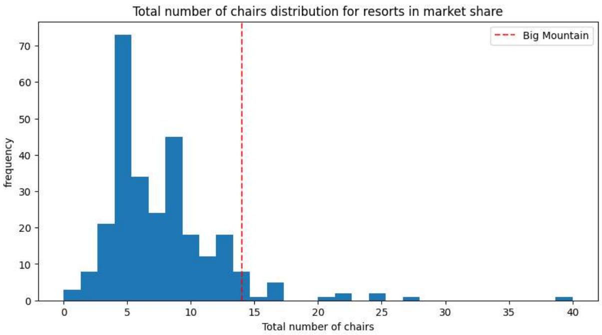


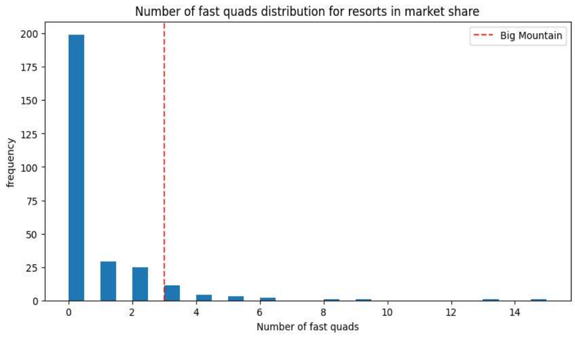
Modeling:

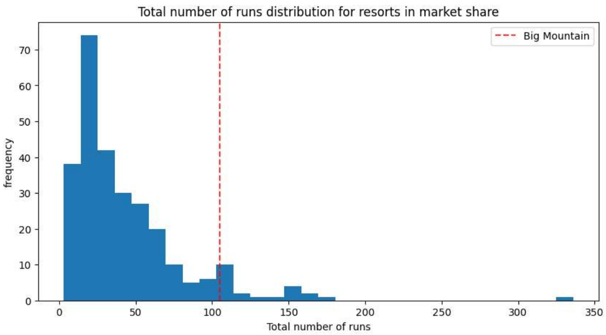
After analyzing eight important aspects, such as vertical drop, total chairs, fast quads, longest run, number of trams, number of runs, area covered by snowmakers, and skiable area, it was clear that Big Mountain Resort outperformed other resorts in most categories. Therefore, the resort justifies a higher price. The prediction model estimated a price of $95.87, which is significantly more than the current price of $81.00

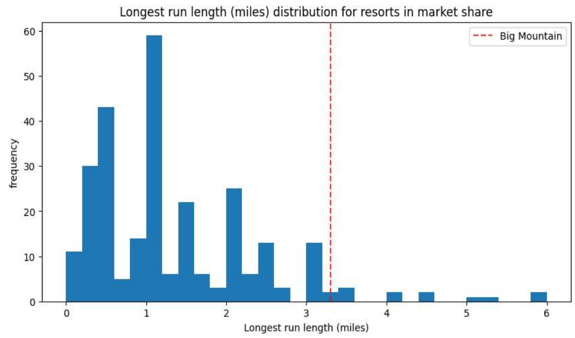


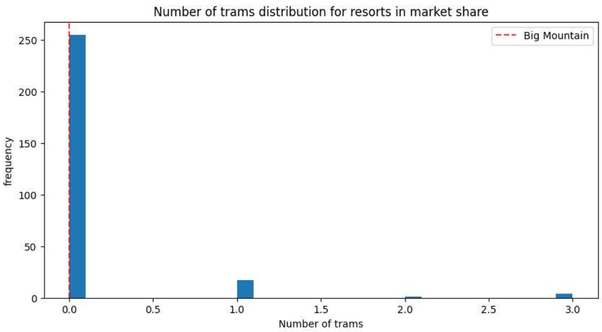


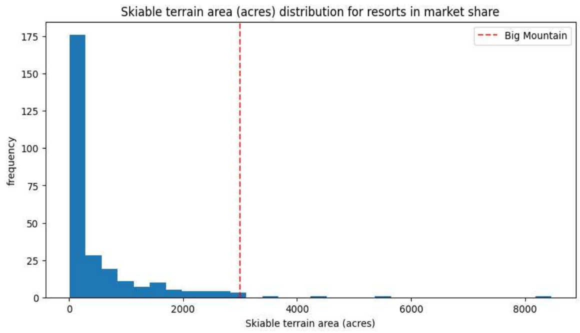












Pricing recommendation:

At present, Big Mountain charges $81 for tickets on both weekdays and weekends. Based on our model, we predict that the ticket price could be increased to $95.87. The expected mean absolute error of $10.39 indicates that we could potentially increase the ticket price by this amount. An absolute error of $10.39 indicates that we have room to raise the ticket price by this amount.

Conclusion :

Big Mountain is positioned towards the higher end of the price range compared to other resorts in terms of market share. Nevertheless, it boasts several features that are uncommon in other resorts. Based on modeling scenarios, it has been observed that shutting down the least frequented 5 runs has a negligible impact on the projected revenue. However, if six or more runs are closed, it can have a significant impact on revenue. Moreover, elevating the vertical drop by 150 feet supports an increase of $1.99 increase in ticket price. This will generate a total revenue of $3,474,638, more than twice the profit and enough to cover the additional operating costs. On the other hand, increasing the length of the longest run or snow-making acreage does not have a substantial impact on the predicted revenue.

Future scope of work :

It appears that the amount of data available is insufficient to create a reliable model. There is no information on the operating costs of each facility. Additionally, we lack insight into the seasonality of the resorts and how visitor numbers may vary on weekdays versus weekends or during different times of the year. We also do not have any information on competitors' marketing strategies or how this may affect pricing.

The current price of Big Mountain appears to be lower than its modeled price due to the regression model being based on important features such as facilities, while the current price is determined by business knowledge.

The model can be tested with a new combination of parameters as input in the predict_increase function and documentation is available, including usage instructions, data requirements, and potential use cases. This will help users from various departments leverage the model effectively also the model could be packaged in an API.