Big Mountain Resort (BMR) Project Report

Big Mountain Resort (BMR), serves 350K customers/year and can accommodate customers of all levels and abilities. Their profit margin is 9.2%. This year they have installed a new chair lift for improved visitor distribution, however it increases operational costs by ~$1.5 million. BMR would like to receive recommendations for this season to recoup the increased OPEX and would like to know the estimate for this year's revenue. Following outlines model report sections.

Problem Identification Overview

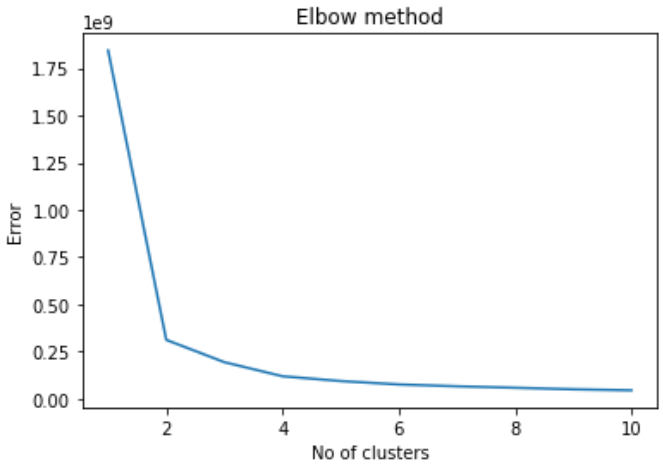
BMR's requirements lend the following question: What recommendations can be implemented this season to reduce OPEX or increase revenue such that the increased OPEX of $1.5million due to lift is recouped to maintain Big Mountain Resort's profit margin at 9.2%. **The focus during this iteration was limited to increase revenue by increasing Adult Weekend ticket price**. For the guided project, one-year data from 330 resorts was analysed. This data consists of location, geographic features, land characteristics, and ticket pricing information saved in 27 columns. A linear regression model was created to predict Adult Weekend ticket price at BMR based on the known resort characteristics. It is expected that the predicted Adult Weekend ticket price will achieve the revenue growth goals of BMR.

Data Preprocessing steps of note

NaN values of the dataset were dealt with depending on the variable (column) type. For e.g. TerrainParks which represents parks in vicinity was changed to 0, where ever NaN was specified since it represents the number of parks adjoining the resort. The first step of EDA involved plotting data tables and understanding the descriptive statistics of the data set. Data points beyond 3 times the IOR was regarded as outliers and was removed. This reduced the number of observations to 158. Further correlation matrix using Pearson's correlation heatmap and pair plot was plotted. Columns that had greater than 95% correlation coefficients were dropped to avoid multi-collinearity issues.

Model Description

Kmeans algorithm was utilised to identify the optimal number of clusters. The elbow plot shown here points out to 3 clusters being optimal. Finally, 26 features were used to build the model. This was further used to create an additional feature column of clusters. The data was then split into 75/25 proportion of train and test data of 129 and 43 rows respectively. A linear regression model was created to model the data. Other options such as the linear ridge and random forest



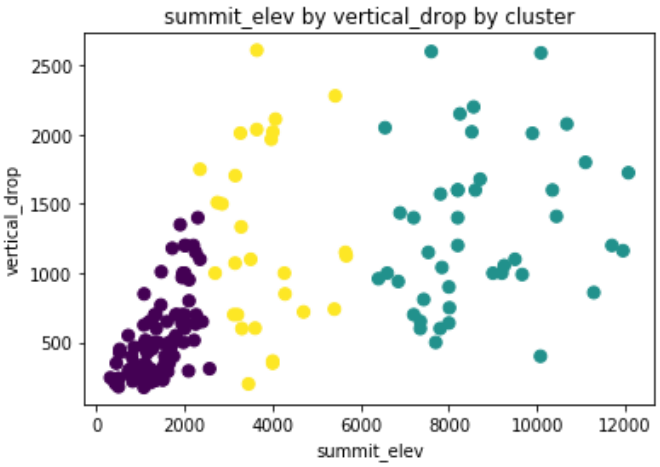
regressor were tried. However, this analysis was limited to the linear regression model.

Model Performance

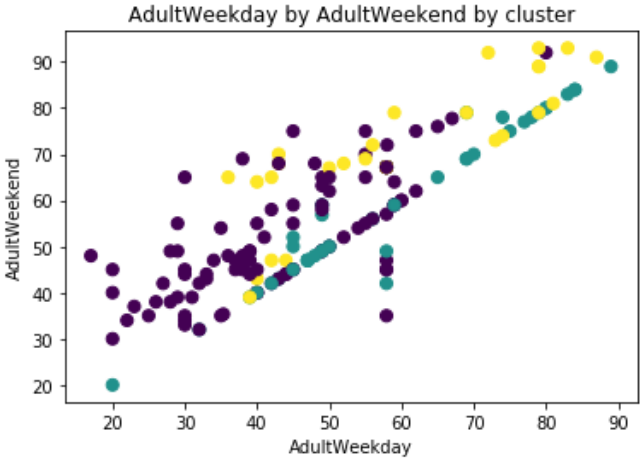
The model performance changed with reducing certain features. Dropping state column significantly improved the model RMSE and Explained Variance. Further, dropping the summit elevation and base elevation columns did not improve the model performance. For model training the state column was dropped. The final linear model that was used had a Explained Variance of 0.68, RMSE of 8.21 and its intercept was $57.19 compared to average Adult Weekend ticket price of $57.25.

Model Findings

Sorting absolute values of coefficients shows that the top 5 features utilized by the model to predict the Weekend price were: Adult Week day price, summit elevation, vertical drop, the Kmens created cluster feature , and average snowfall. The adjoining figure shows vertical plot vs. summit elevation color coded by clusters. Clearly, the 3 clusters identified by the K means algorithm are visible in the scatter plot. Further, there seems to be a sliigh positive correlation between the two quantities. Similarly, the adult weekend price was plotted against the summit elevation data. This scatter plot also clearly shows that the Kmeans has clusted the data into



3 groups. Given various features it is difficult to visually conclude the significant features, especially since the correlation between the response variable, Adult Weekend price , and the features was low.



Recommendation

The linear model predicted Adult Weekend price to be about $82, this is $1 more than the current price of $81. If it is assumed that the Adult Weekday price can also be increased by $1, since they are highly correlated (as shown in the adjoining

figure) and given that BMR served about 300,000 customers a year, the additional revenue with ticket price increase is $300,000, this is significantly short of the $1.5 million revenue increase goal that sustains the ~9.2% profit margin. Clearly, the model prediction of setting Adult Weekend price of $82 cannot be recommended to the management, it fails to meet the criteria for success outlined in the PWR. Either other opportunities should be considered for increasing revenue or the Data Processing and Modelling steps should be revisited. The current linear regression model's Explanation of Variance of 0.68 is very low, leading to low confidence in the model created.