Guided Capstone Project Report

Black Mountain Resort (BMR) recently installed an additional chair lift which increases their operating costs by $1.54 million this season. Investors want to maintain or exceed their profit margin of 9.2% to include the added operating cost. Our investigation is to see what actions BMR could take to change to at least maintain their profit margin.

Ms. Alesha Eisen, the database manager, provided us with a single CSV file that contains metadata from 330 resorts sharing the same market as BMR. The time period was from last year's open season. This is where we focused our investigation.

We used a Supervised linear regression model to predict the price of the "adult weekend" resort ticket. The steps, code, and outline are shown on Github. The link has already been sent to your emails.

Some interesting preprocessing features to note:

1. The regions and state columns were effectively the same. We dropped the regions column.
2. Almost half (13 out of 27) of the columns had missing values. Of that, 8 columns had missing values above 10%. We imputed the missing values by filling in 0 where appropriate (such as the number of ski lifts), and the mean in others (such as days open last season).
3. We had a few outliers mainly due to the vast difference in terrain between the resorts. Using the quantile method, we extracted the data that were not extreme outliers. Unfortunately, it effectively cut our data in half and it extremely affected

our modeling. Because of this, we decided to keep the full dataset and use it in our modeling.

Prior to Modeling, we used an Elbow plot to determine the number of clusters for our k-means clustering implementation. We added this information to our dataframe. We isolated the "Adult Weekend" column as our response variable. We processed our data so that it was all the same scale. We split the data into two groups with 75% in the training category and 25% to test. We measured our data using coefficients, explained variance score, and mean absolute errors.

For our first model iteration, we used dummy variables for our States. Unfortunately, they also became the top coefficients which are hard to make actionable changes from. This is why we dropped them for our second iteration. Because summit elevation and base elevation were so highly correlated to our measured variable, we decided to drop them for our third and final model.

The third model came back with an explained variance score of .91 with a mean absolute error of 5.69. This performed marginally worse than Model 1 with scores of .92 and 5.40, respectively. We decided to present the third model because it is based on features that are not highly correlated to Adult Weekend prices, and are not related to data that we have no control over (such as state location and elevation).

After, we isolated the BMR data and scaled it down. The actual adult weekend price is $81.00. Based upon all available market data from all the resorts, the actual adult weekend ticket should be $88.08. By increasing ticket prices to this amount, this can help offset the increased cost of the extra chairlift while not being above market price.

Further areas of investigation include adult weekday ticket prices and total days open per season. Once we investigate those two potential factors, we can give Mr. Blackburn and BMR a recommended action plan on how to keep their 9.2% profit margin, and how it would affect this year's annual revenue.