1   Problem Description

Big Mountain Resort has recently installed an additional chair lift to help increase the distribution of visitors across the mountain. This additional chair increases their operating costs by $1,540,000 this season. Every year about 350,000 people ski or snowboard at Big Mountain. This business profit margin is 9.2% and the investors would like to keep it there. The business is eager to get your recommendations on recouping the increased operating costs from the new chair this season. Additionally, what can they expect this years' annual revenue to be if they make the changes you recommend?

2   Methodology

To find the dominant factor which can be controlled so that a recouping maneuver can be performed. We performed a multi-linear regression of the cleaned dataset. Since, in the linear regression a weight was given to each of the features on which the management can then clearly focus. The following results were obtained after performing the multi linear regression of the dataset.

3   Results & Discussion

Using the multi linear regression process the following parameters were identified to be dominant arranged in their decreasing order of significance.

The explained variance score is close to unity (see table 2) which means that there is a good degree of match between the model and the real data. This can be appreciated by the following plot: Thus from the table 1 it can be inferred
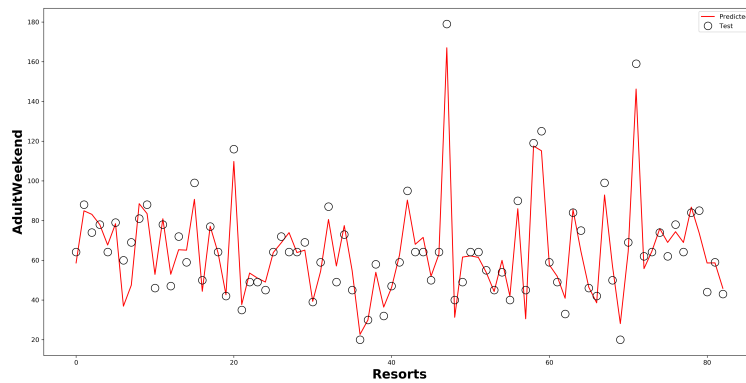

Figure 1: **Fitted and observed data: x axis represents the number of resorts and on y axis is the price in $ for the weekend.**

Features	Coefficient
AdultWeekday	19.804378
clusters	5.785507
summit_elev	4.615301
Runs	1.778356
triple	1.409817
averageSnowfall	1.403284
surface	1.400849
vertical_drop	1.110180
quad	1.034007
fastQuads	1.030865
projectedDaysOpen	0.813819
NightSkiing_ac	0.759572
Snow Making_ac	0.632391
LongestRun_mi	0.602572
total_chairs	0.592885
fastSixes	0.306141
yearsOpen	0.294494
SkiableTerrain_ac	0.257063
fastEight	0.217139
double	0.161293
trams	0.154861
TerrainParks	0.085845
daysOpenLastYear	0.082331

Table 1: **Features arranged in the order of their importance; higher to lower**

explained_variance_score	mean_absolute_error	score
0.932	5.152253	0.931722

Table 2: **Performance metrics of the fitted model**

where to put the resources to recoup the extra cost. A simple calculation can demonstrate this. Since, the cost has gone up by 1.5 million $s. Therefore, the change in the profit margin will be given as:

$$\textbf{New profit}\% = 9.2\% - \frac{1.5 \times 100}{Net - sales}\%$$

(1)

So, if the management doesn't take any step and if their sale is only to recover the increased spending then their profit will at least dip by 1% to 8.2%. To recoup this extra amount, it might be advisable to increase sales. Increasing the price can be one straightforward remedy but this may decrease the persons coming into the park. The other more intriguing detail can be gleaned by looking at the following plots: So, one plausible solution is to increase the frequency
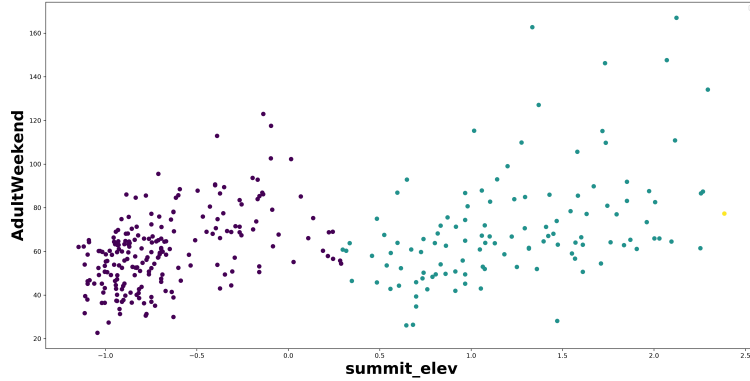

Figure 2: **Clustered (shown in two different colors) plot of summit elevation vs prices on the weekend**

of the rides going up the summit which has much higher prices than the one at the bottom of the summit. This will increase the sales and will allow to recoup a portion of the investment made. Another way around is to increase the prices of the tickets over the weekdays–since it has a significant weight in the overall regression process.
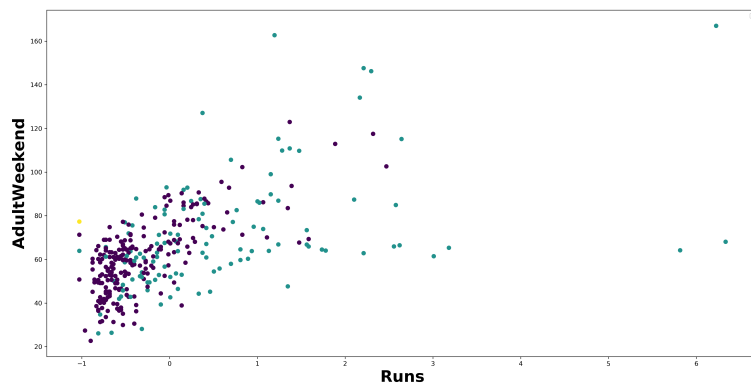
Figure 3: **Clustered plot of runs vs prices on the weekend**