Project: Diamond Prices

Step 1: Understanding the Model

Answer the following questions:

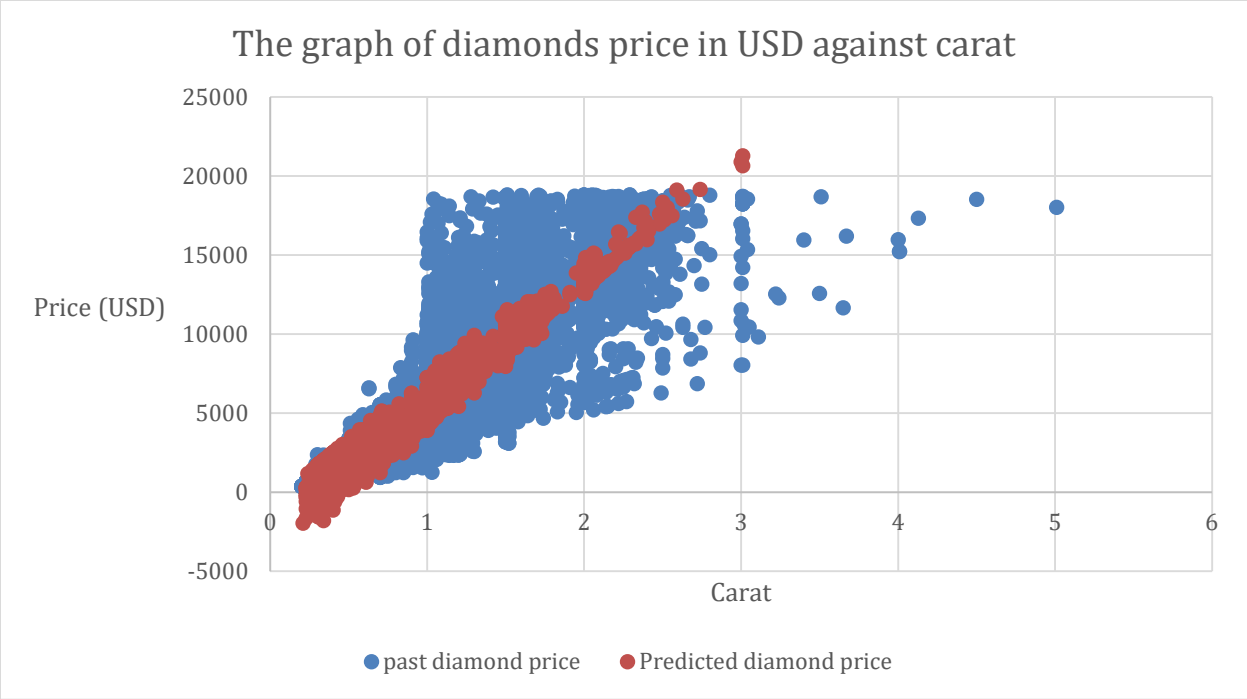
1. According to the linear model provided, if a diamond is 1 carat heavier than another with the same cut and clarity, how much more should we expect to pay? Why?
   We should expect to pay $8,413 more. According to the linear regression model formula, the one additional carat would result in an additional $8,413 in price. The formula created from the linear regression model determined that the coefficient for 1 carat is 8,413, so for every increase in carat the price will increase by the amount of the coefficient.

2. If you were interested in a 1.5 carat diamond with a **Very Good** cut (represented by a 3 in the model) and a **VS2** clarity rating (represented by a 5 in the model), how much would the model predict you should pay for it?
   Using the formula given,
   model-predicted price = -5,269 + 8,413 x **Carat** + 158.1 x **Cut** + 454 x **Clarity**
   = -5,269 + 8,413(1.5) + 158.1(3) + 454(5)
   = $ 10,094.80

Step 2: Visualize the Data

Make sure to plot and include the visualizations in this report. For example, you can create graphs in Excel and copy and paste the graphs into this Word document.

1. Plot 1 - Plot the data for the diamonds in the database, with carat on the x-axis and price on the y-axis. (refer the plot at no.3 or the excel attached)
2. Plot 2 - Plot the data for the diamonds for which you are predicting prices with carat on the x-axis and predicted price on the y-axis.
   - **Note**: You can also plot both sets of data on the same chart in different colors. (refer the plot at no.3 or the excel attached)
3. What strikes you about this comparison? After seeing this plot, do you feel confident in the model's ability to predict prices?



The predicted prices are more compact than the actual data is. This is because the formula does not take color into account and a subtle difference in color can have dramatic effect on the pricing. Diamonds that range from colorless to light yellow and brown have the range of highest pricing to lowest whereby colorless diamonds, which are the rarest and most valuable, act as the standard for grading and pricing.*
*https://www.gia.edu/diamond-quality-factor

After looking at this plot, the model appears to have adequate ability to predict price, but it can be very off due to different colors and at carat equal to or more than 3. There appears to have diamonds with carat less than 1 selling at negative prices which sound illogical. Although the formula may not be accurate for a diamond, it should do a decent job at predicting the price for several diamonds at once since the plot on the average looks representative.

Step 3: Make a Recommendation

Answer the following questions:

1. What price do you recommend the jewelry company to bid? Please explain how you arrived at that number. HINT: The number should be 7 digits.

I would recommend the jewelry company to bid at price $2,737.82 for a diamond. From the 3000 diamonds predicted bid prices, the average predicted bid price for a diamond is $3911.17. The jewelry company generally purchases diamonds from distributors at 70% of that price, so the purchase price is $3,911.17*0.7 = $2,737.82.