Project: Diamond Prices

Step 1: Understanding the Model

Answer the following questions:

1. According to the model, if a diamond is 1 carat heavier than another with the same cut, how much more should I expect to pay? Why?

    - In a situation where the diamond is 1 carat heavier than another diamond that has the same cut and clarity, the diamond would cost an additional 8413. This value is determined using the multiple linear regression model that is applied to all the numerical variables to derive a simple formula with weighted values.

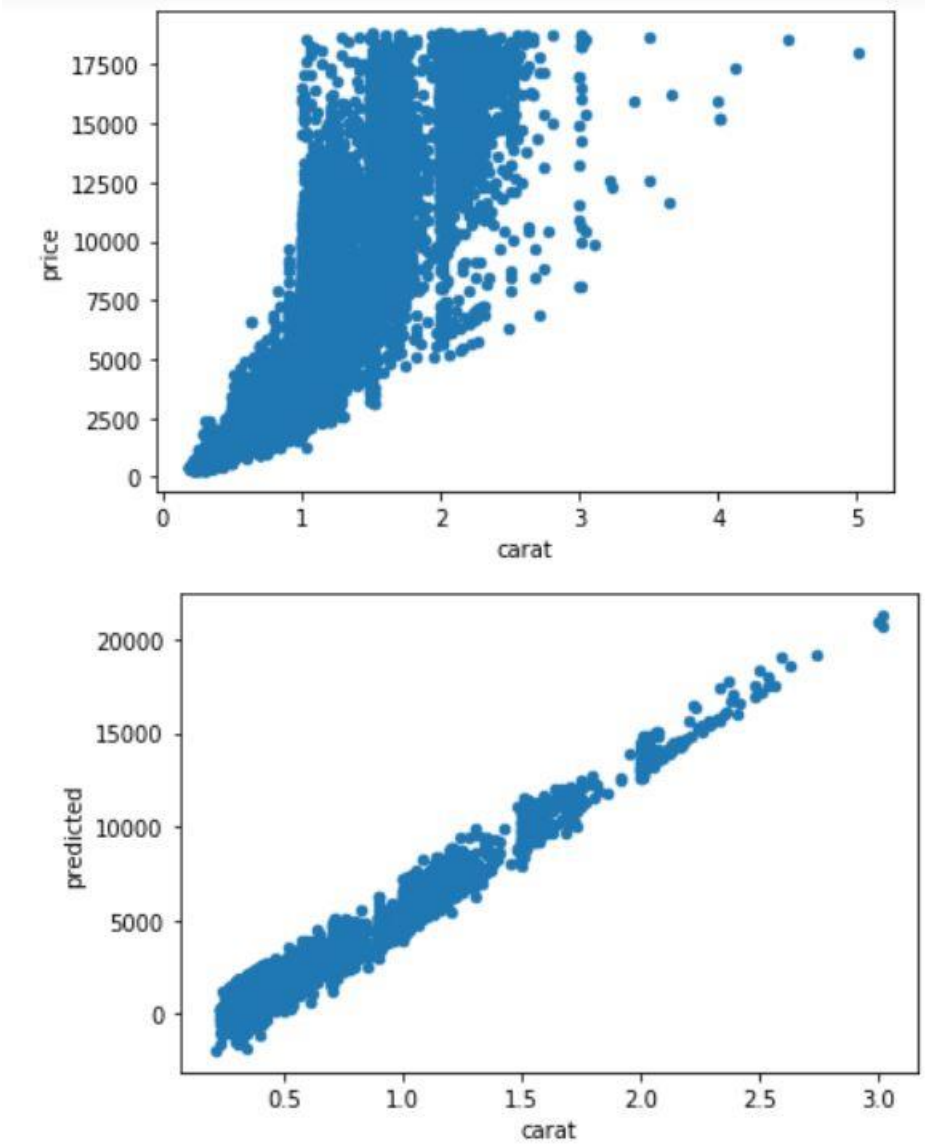
2. If you were interested in a 1.5 carat diamond with a **Very Good** cut (represented by a 3 in the model) and a **VS2** clarity rating (represented by a 5 in the model), how much would the model predict you should pay for it?

    - The formula for predicting the bid price for individual diamond is:
      Price = -5,269 + (8,413 x **Carat)** + (158.1 x **Cut)** + (454 x **Clarity)**
    - Therefore, the predicted price for the diamond with the given features is found to be 10095.

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.
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.



3. What strikes you about this comparison? After seeing this plot, do you feel confident in the model's ability to predict prices?
    - After comparing the two plots, the model does seem to conform to the value observed in the actual plot.
    - While the actual price of the diamonds rises exponentially with the rise in carat, the model target price rises linearly with respect to the rise in carat.
    - The model seems to take all the numerical features into account when plotting the chart.
    - As per the sns.heatmap chart below, the predicted price is highly correlated with the carat, which also seems to be the case with the actual prices as well. Thus, hinting towards the fact that carat is a good indicator of price.

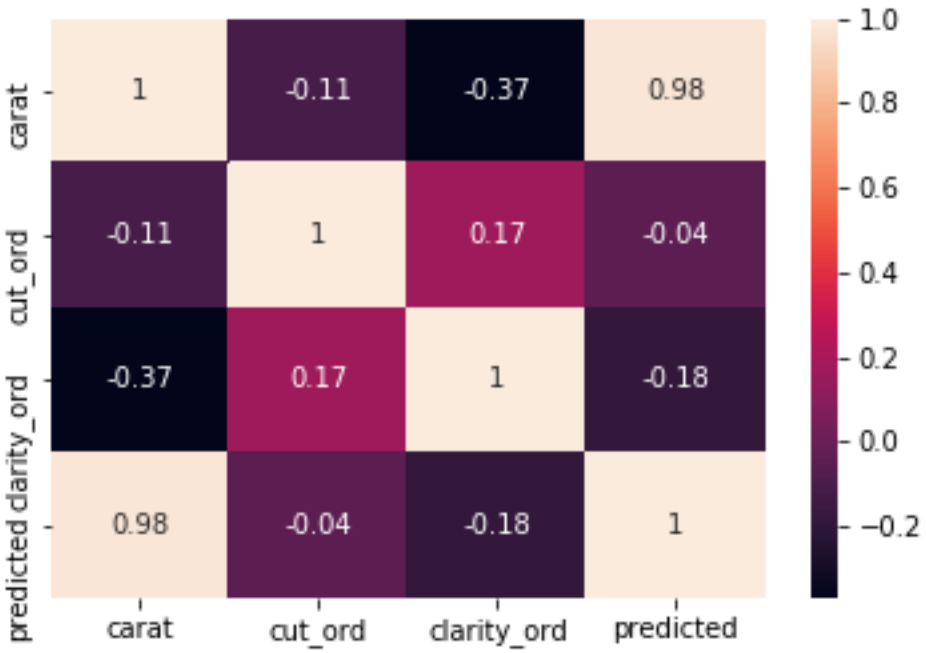


Figure 1: Predicted

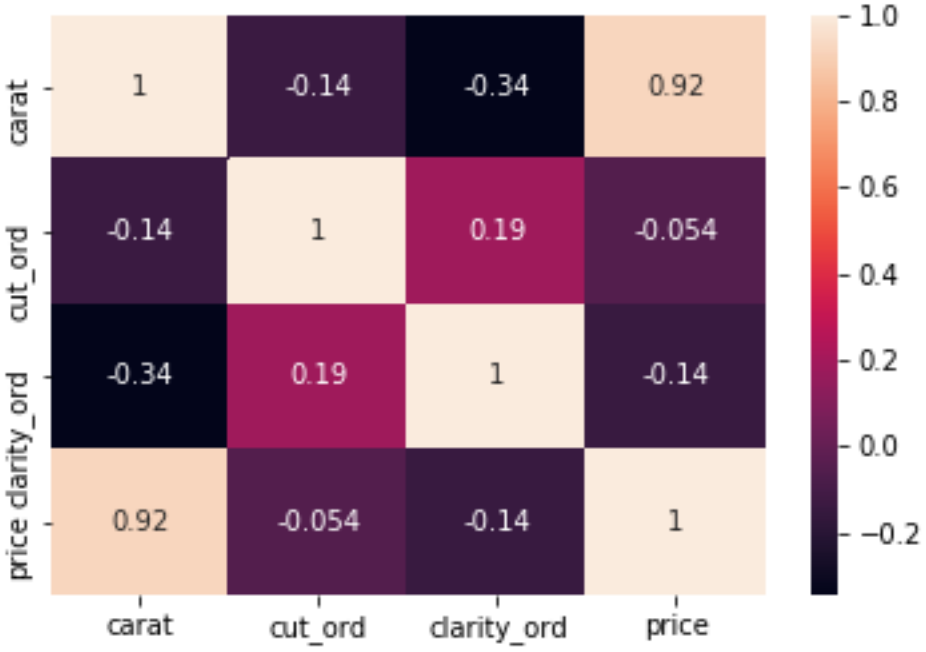


Figure 2: Actual

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.

- The recommended bid price for the 3000 diamonds has to be 8213466. This value was obtained by summing up the predicted values for all the diamonds. This value was then multiplied with 0.70 as the company generally purchases the diamonds from distributers at 70% of the price.

Note: *The currency metric for the given case study has not been mentioned.*