Luyan Deng
4/16/2018
Resubmission

Project: Diamond Prices

Complete each section. When you are ready, save your file as a PDF document and submit it here: https://classroom.udacity.com/nanodegrees/nd008/parts/235a5408-0604-4871-8433-a6d670e37bbf/project#

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?

Assume the first diamond has the price fitting the following equation:
Price = -5,269 + 8,413 x **Carat** + 158.1 x **Cut** + 454 x **Clarity**
The second diamond which is 1 carat heavier but with same cut and clarity
Price1 =-5,269 + 8,413 x (**Carat+1)** + 158.1 x **Cut** + 454 x **Clarity**
Price difference = Price1-Price =$8,413

8413 is the Y interception of the linear equation. For every additional 1 carat diamond, you are expected to pay additional 8413 dollars.

2. If you were interested in a 1.5 carat diamond with a **Ver 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?

Predicted price=-5,269 + 8,413 x (1.5) + 158.1 x (3) + 454 x (5) = $10094.80
Based on the equation, the predicted price is $10094.80.

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.

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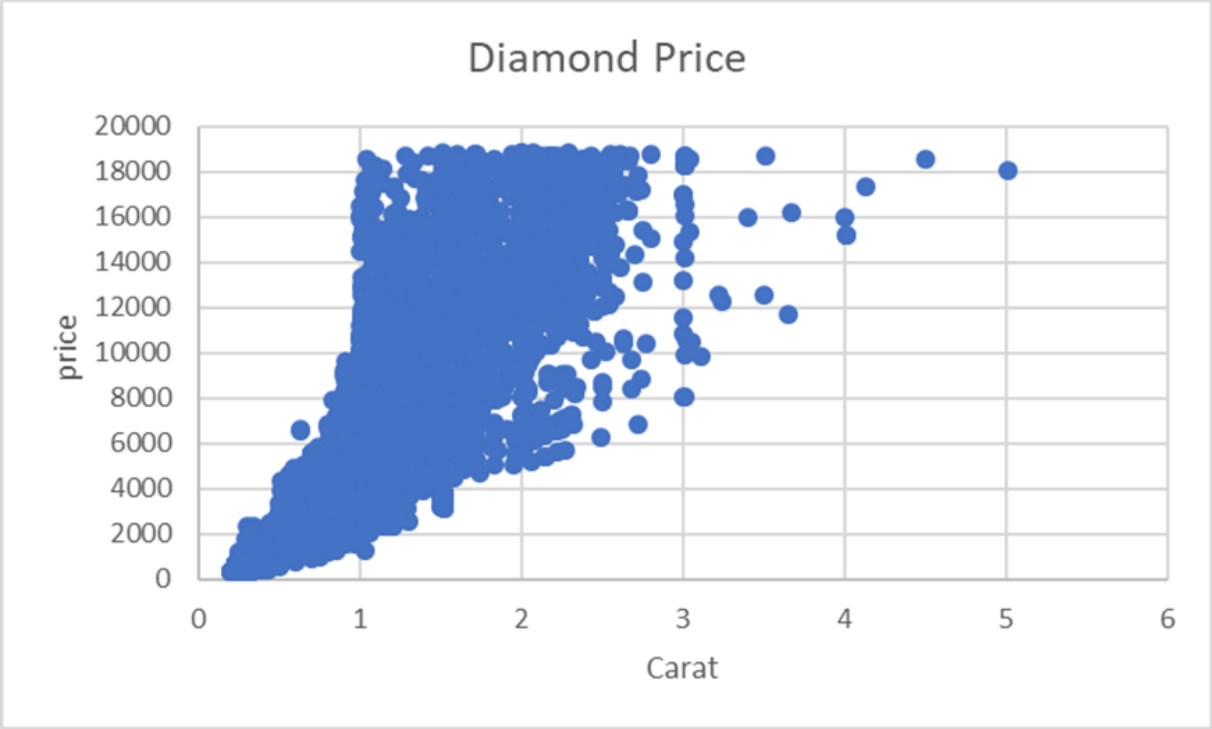
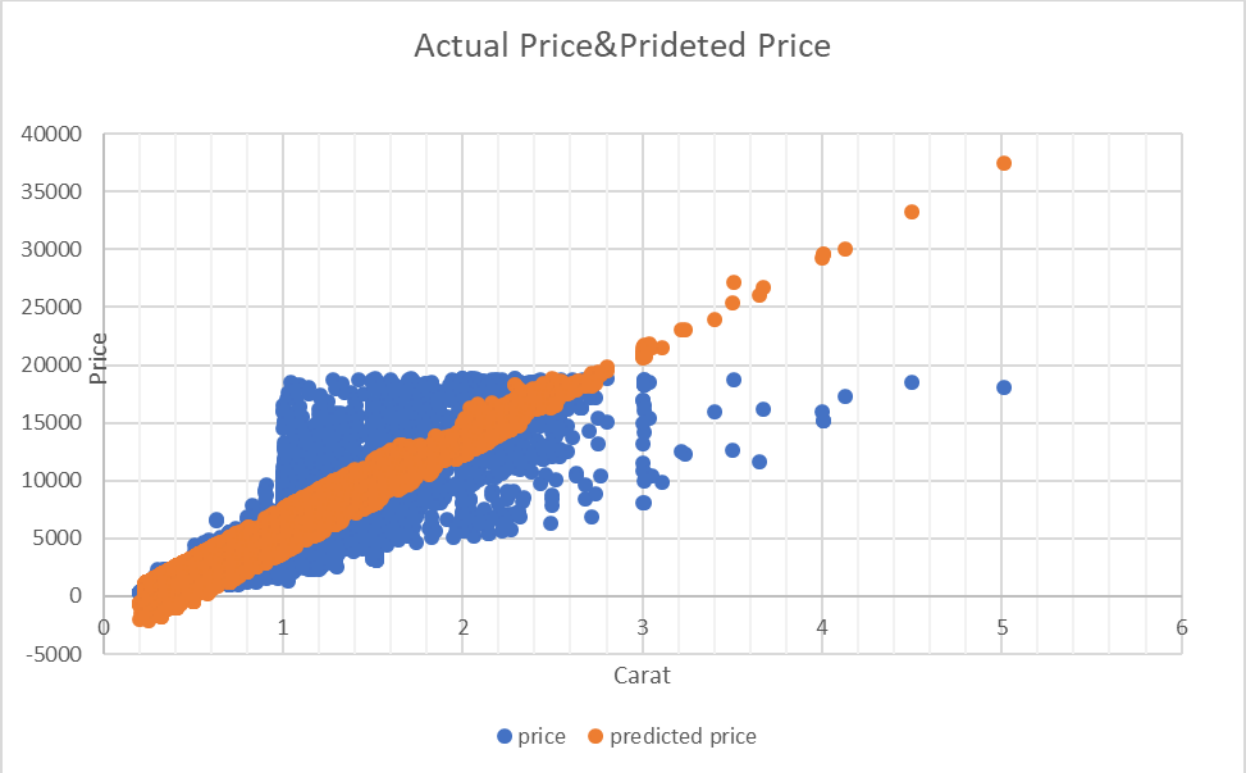


2. Plot 2 - Plot the data for the diamonds for which you are predicting prices with carat on the x-axis and predicted price on the y-axis.
    - **Note**: You can also plot both sets of data on the same chart in different colors.



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3. What strikes you about this comparison? After seeing this plot, do you feel confident in the model's ability to predict prices?
   The equation represents a strong linear correlation between price and some variables. However, it is a limited mode.
   First, it could only provide valid prediction between 0.5 and 3 carat. When the carat amount is less than 0.5, the price will return as a negative number which is invalid.
   Second, after the carat amount exceeds 3, the predicted price is higher than the actual price as the carat amount increases.
   Therefore, more price data related to carat>3 is needed for more accurate predictions.

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 bid for the whole set of diamond should be **$8,213,466**.

   Price = -5,269 + 8,413 x Carat + 158.1 x Cut + 454 x Clarity

The purchase price = sum of the diamond price x 70%
=11733522.8*0.7 =$8,213,466