Assignment 2 – Linear Regression

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Abstract

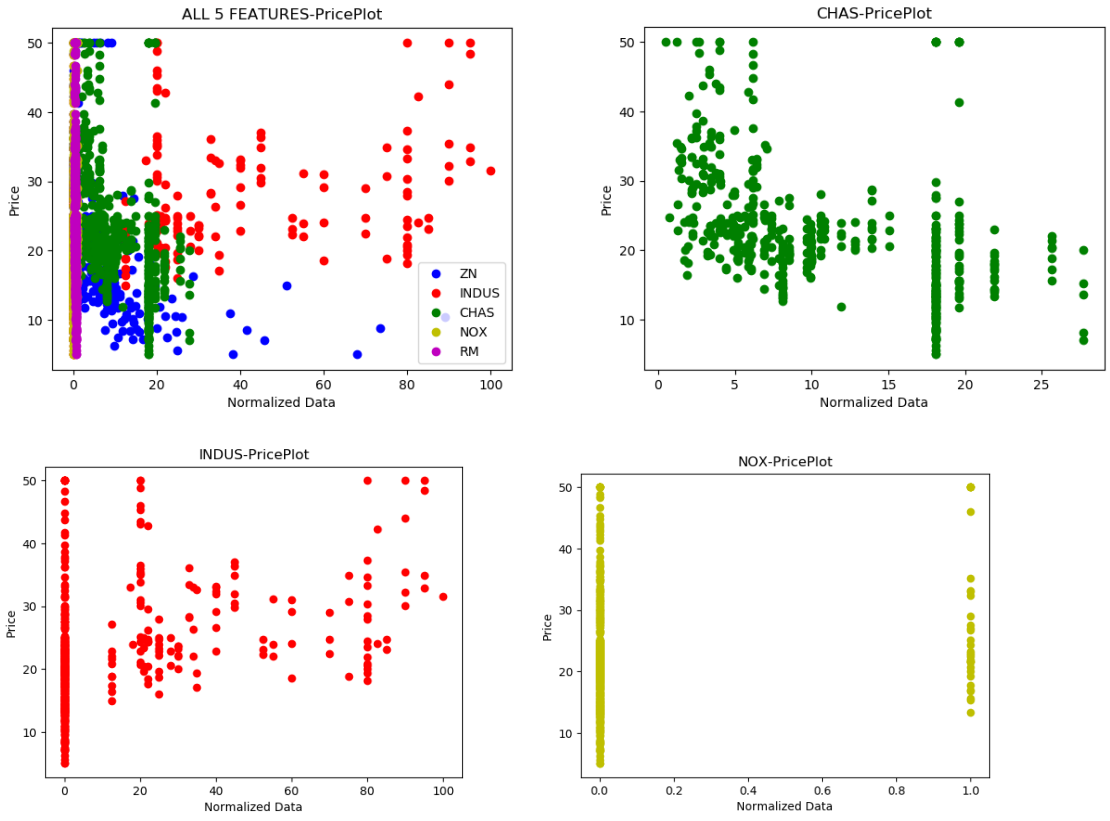
Objective of this assignment is to use linear regression as a model for learning and predicting the prices for houses.

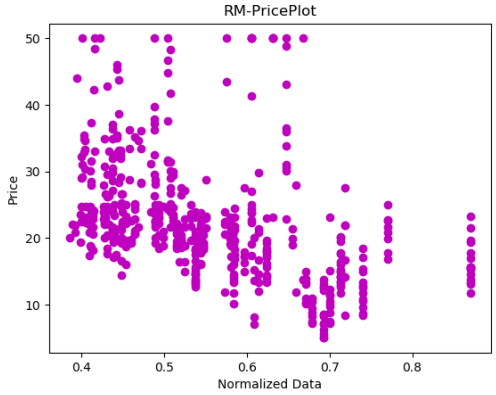
Section 1 LR Equation

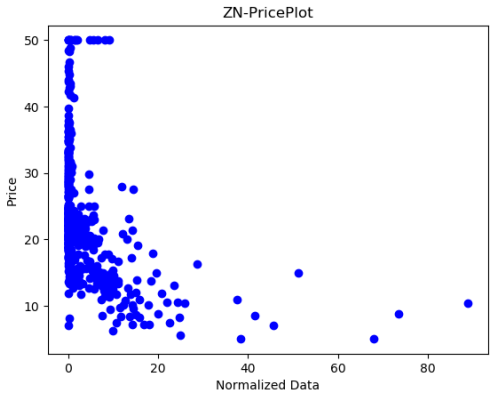
$$\hat{y} \equiv f(X_q) \equiv \sum_{i=0}^{d} w_i x_i$$

It's the gradient of the result.

Section 2 Feature-Price Plot







Section 3 Error Function

$$E = \frac{1}{2m}(y - \hat{y})^2$$

Error is calculated by taking the predicted value minus the actual value and squaring them. Then divide it by the number of features for multi variant models.

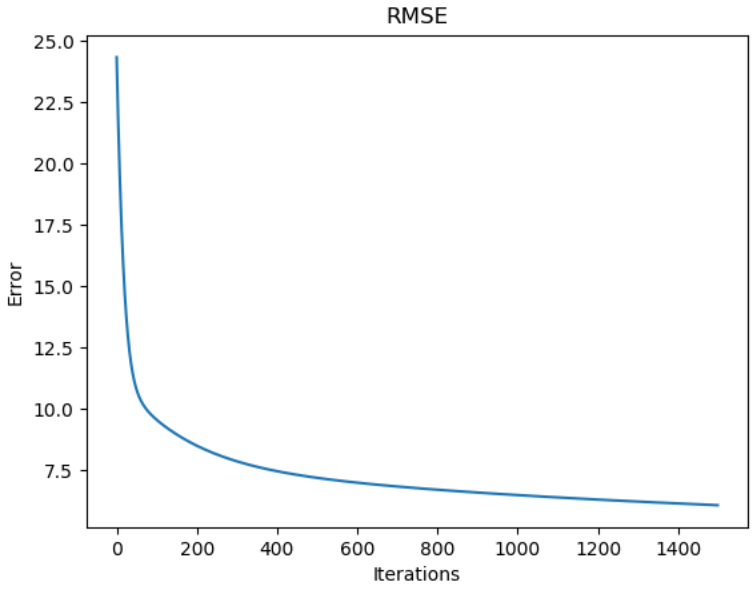
Section 4 Gradient Descent

$$W = \sum_{i=1}^{Iterations} W + \frac{\alpha}{Samples} \sum_{n=1}^{Samples} \left(y - \hat{y}^{(n)}\right)$$

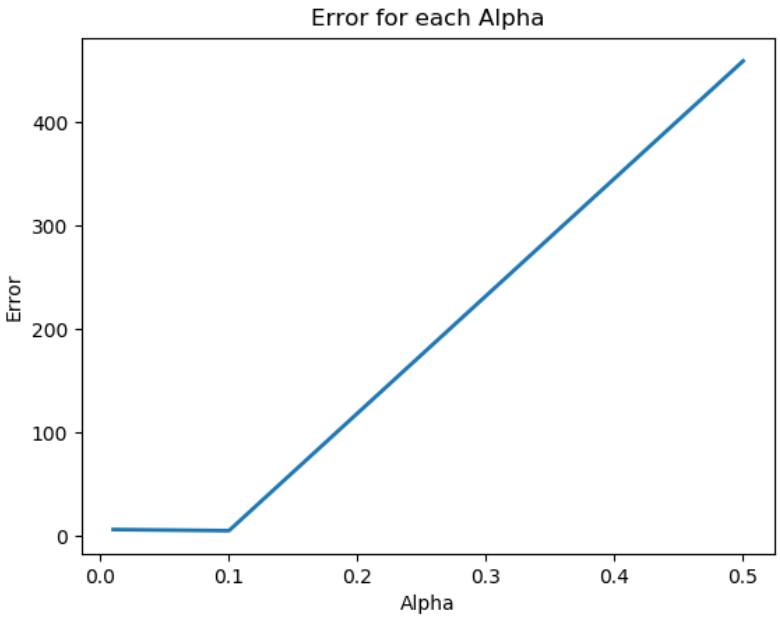
You use the default W as an array of zeros with the size of the samples and find $\hat{y}$ by doing dot product with the [samples by features] matrix.

You can then find delta W_n for each samples into another matrix to be scaled by alpha and added to the previous W to get the new W. This will help W's error get smaller the more iterations it goes through.

Section 5 Experimental Result



The error decreases along the number of iterations.



The best learning rate alpha is 0.1 as it has the lowest error.