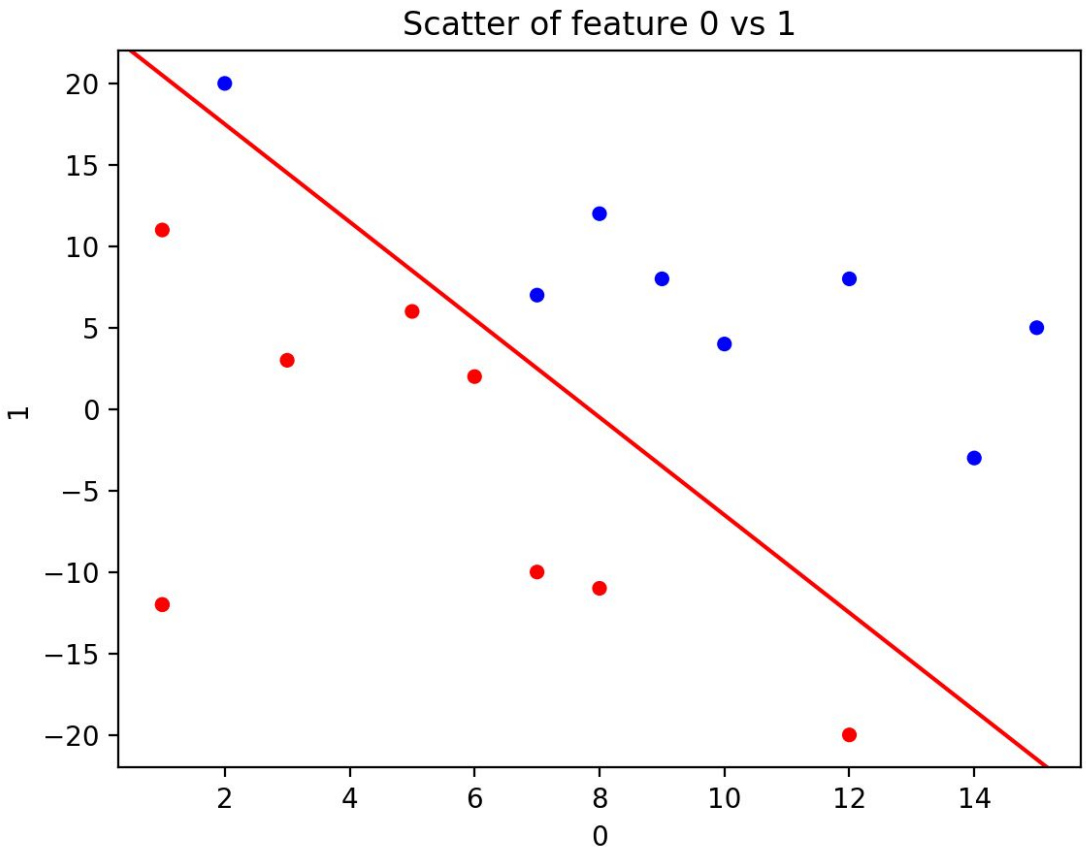
I. Perceptron

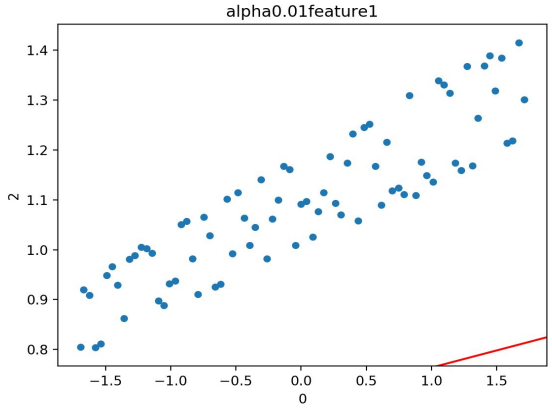
The model is converged after 30 iteration, the final result looks like this:

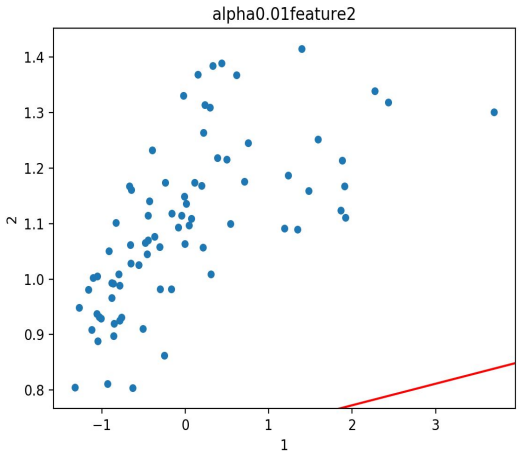


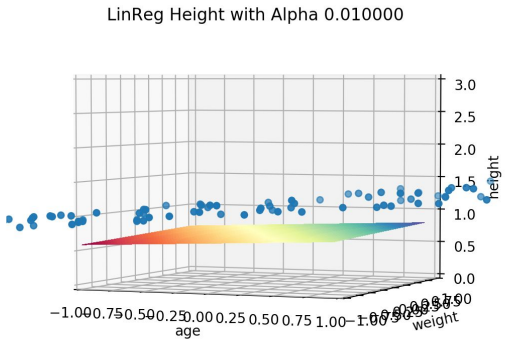
The red line is drawn with the weight and bias of the perceptron model.

II. Linear Regression

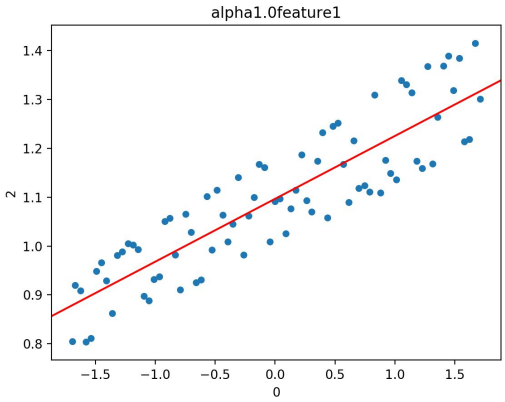
The best alpha value is 1, if the alpha value is too low the model does not fit the data, if the alpha is too high the model will pass the optimal solution and is not viable. I use decimal space of three for the weight and bias.

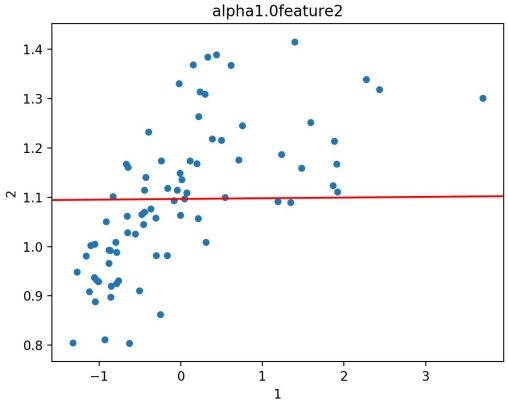


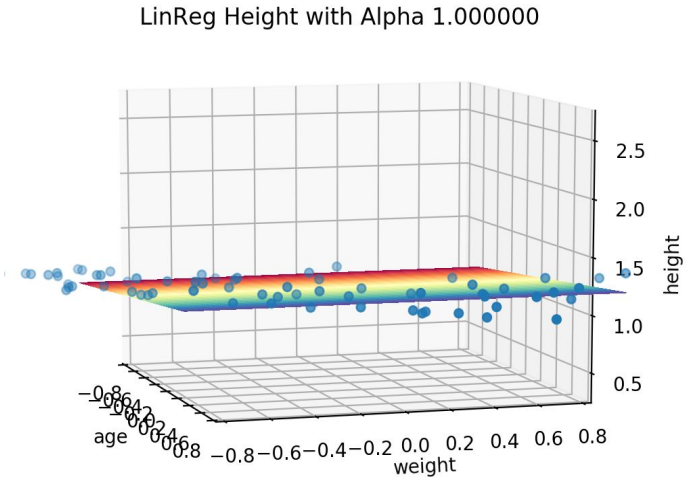




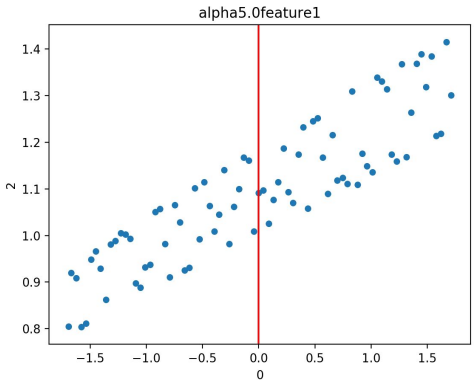
When alpha is too small the model cannot fit the data after 100 iteration.

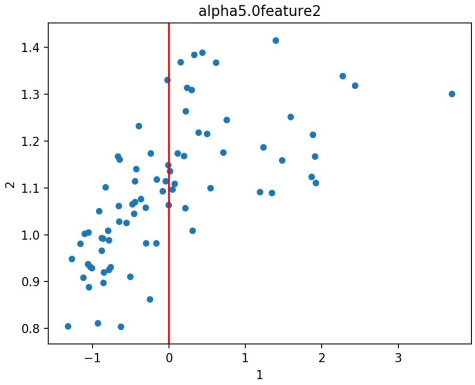


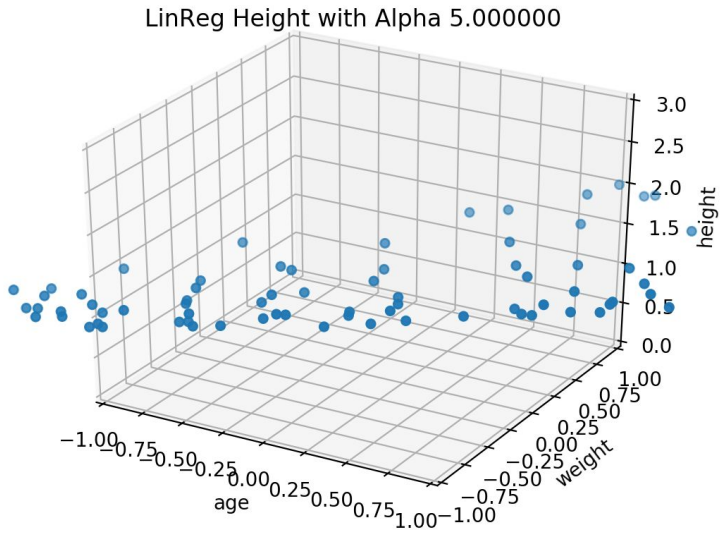




When alpha is optimal, the model fits the data and the hyperplane can seperate the datapoint.







When alpha is too high, the linear model will miss the optimal weight and cannot fit the data. It seems the hyperplane does not exist in this situation.

III. KMeans Segementation

Use 2, 6 and 8 as the k value for the k means model. After clustering, repaint the pixel in the same cluster into same color.

Segmentation with k = 2.

Segmentation with k = 6.

Segmentation with k = 8.

By comparison we can see that when k = 6 the tree is distinctive separated from the background and foreground with a solid color. When k is too low we cannot distinguished the tree from the foreground and when k is too high the color features on the tree become too complicated.