Assignment 00010
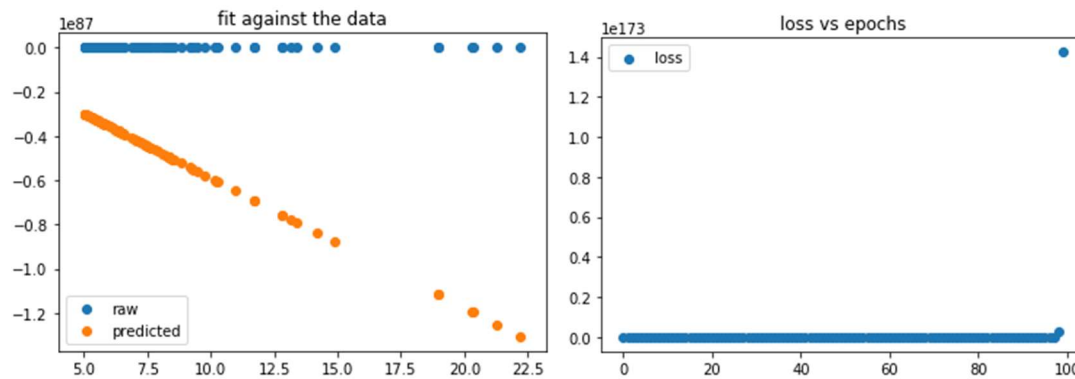
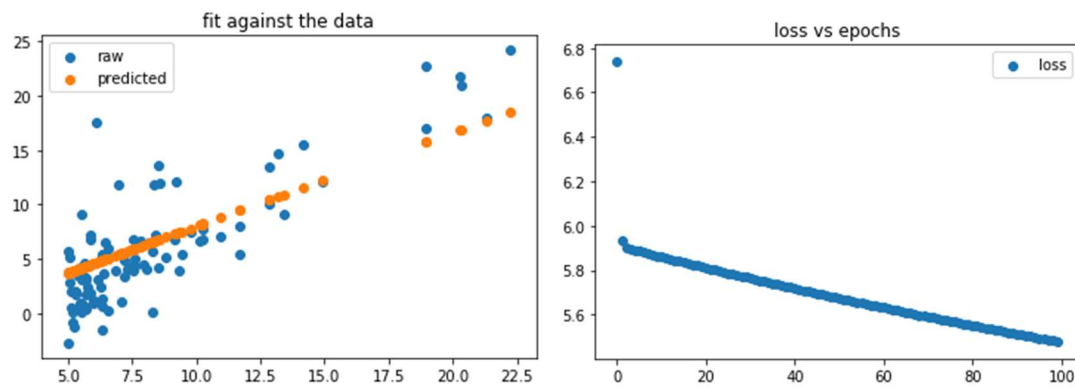# IST 597 – Deep Learning

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Problem 1:

The below are the observations for the experiments by tuning the learning rate/step size for this linear model.
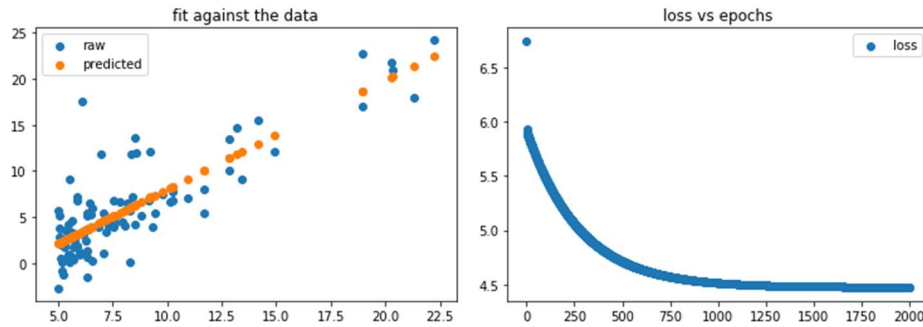
Exp 1: alpha = 0.1 … epochs = 100

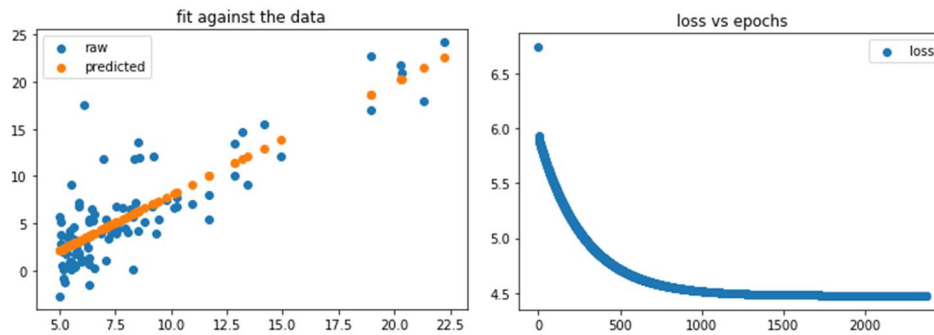For the value of alpha = 0.1 we can see that the function is not converging here.

Exp 2: alpha = 0.01 .. epochs = 100

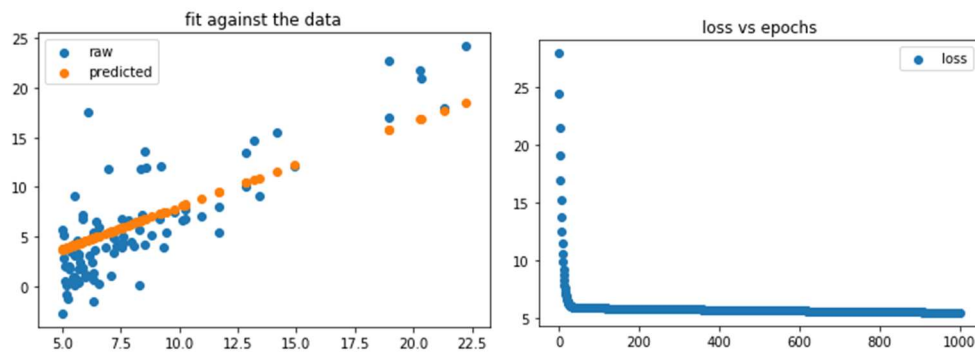**Exp 3: alpha = 0.01 .. epochs = 2000**
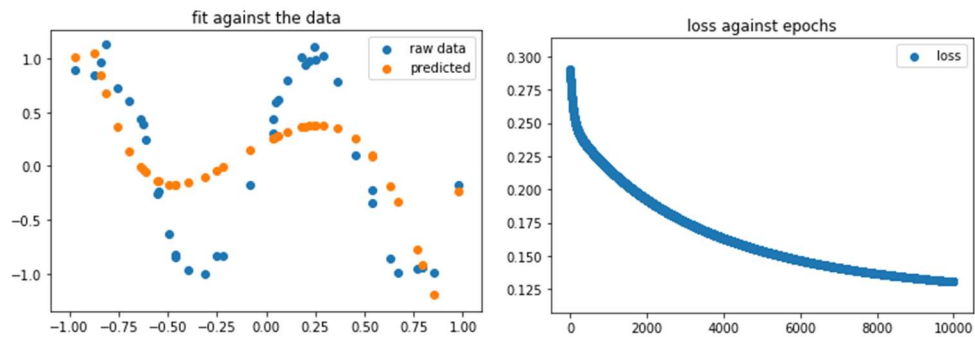
Exp 4: alpha = 0.01 .. epochs = 5000
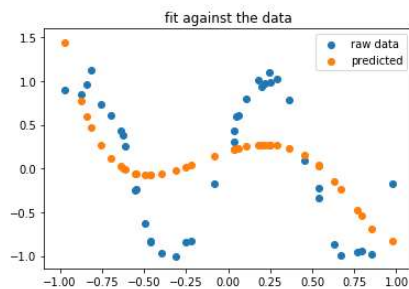

Exp 5: alpha = 0.001 .. epochs = 1000

From the above experiments we can observe that the epochs of at least 1000+ is required for the function to converge. And with the value of alpha = 0.01 and 0.001 these are the results whereas with the value of alpha = 0.1 the function was not converging even for the epochs greater than 1000.
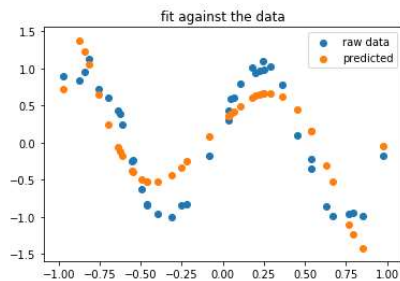
Problem 2:

Exp 1: alpha = 0.01 .. epochs = 10000 .. order = 25 .. beta = 0.1 ..

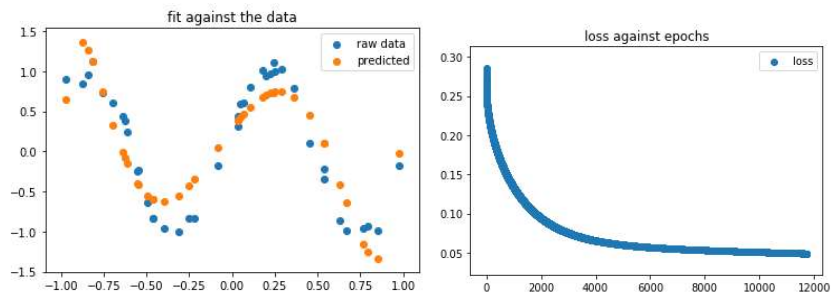**Exp 2: alpha = 0.06 .. epochs = 1000 .. order = 9 .. beta = 0.01 ..**

Exp 3: alpha = 0.06 .. epochs = 10000 .. order = 15 .. beta = 0.0 ..

Exp 4: alpha = 0.01 .. epochs = 10000 .. order = 25 .. beta = 0.1 ..

Here for the values of the beta = 0.001 and alpha = 0.06 for 15,000 epoch the functions is converging better. But whereas for the beta = 0.1 and 1 I have experimented with various alpha values for the epochs ranging from 1000-20,000 the function was not converging.

This with the increase in value of beta I have observed that the model fitting is deteriorating. With lesser values of beta, I am getting better model fitting here.

And with the higher orders than 15 I have observed the overfitting behavior in the mode fitting when I tried to finetune the parameters alpha and high epochs.

Problem 3:

Exp 1: alpha = 0.01 .. epochs = 5000 .. order = 6 .. beta = 0 ..
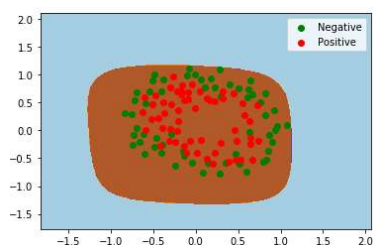
As part of first experiment the value of beta is kept at zero (no regularization) and tuning only the epochs count and learning rate alpha.

Order is also kept constant at 6 for this problem as given.
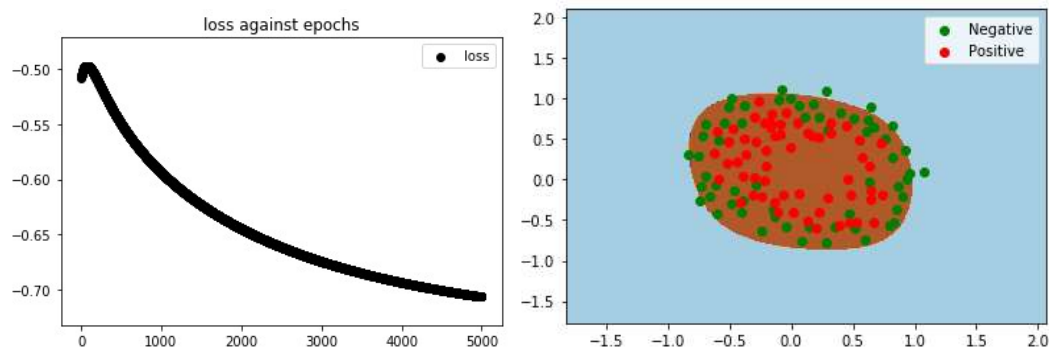
Here loss = 0.70 and the accuracy score of 55%

**Exp 2: alpha = 0.001 .. epochs = 5000 .. order = 6 .. beta = 0 ..**

By decreasing the learning rate from 0.01 to 0.001 here the loss have improved to the value of 0.54.

At this point even by increasing the number of epochs higher up to 10,000 is not showing any observable changes in the accuracy and the loss.

Now experiment with the regularization for beta values = {0.1,1,10,100}
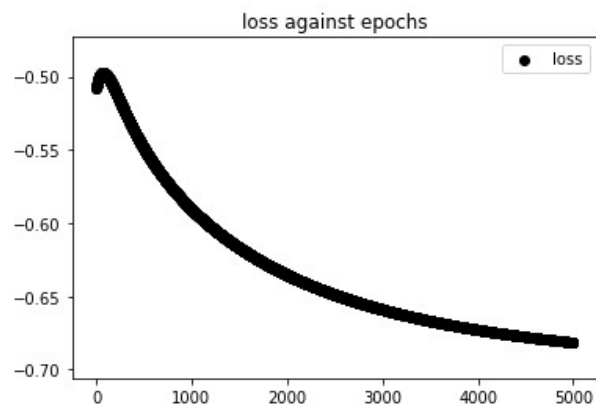
Exp 3: alpha = 0.01 .. epochs = 5000 .. order = 6 .. beta = 0.1 ..
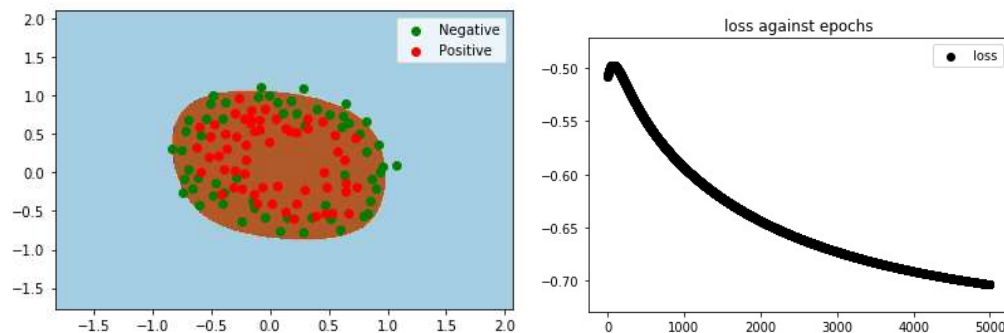
With the inclution of the regularization the accuracy is somewhat increases for the same values of alpha. Now for this configuration the accuracy is = 55% and the loss 0.70 value.
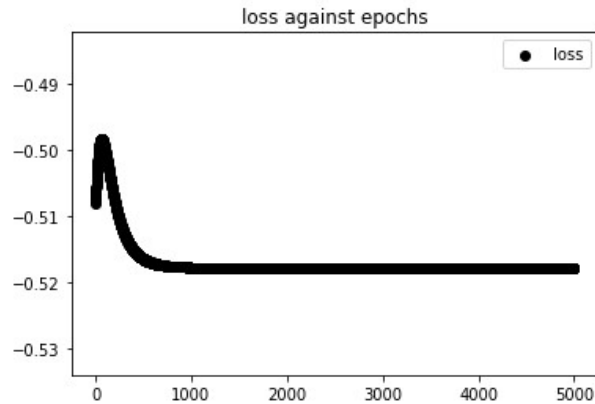
Now I will further increase the value of beta by keeping all other paramaters same and constant.

Exp 3: alpha = 0.01 .. epochs = 5000 .. order = 6 .. beta = 1 ..


With the inclution of the regularization of beta = 1 for the same values of alpha. Now for this configuration the accuracy is = 51% and the loss 0.69 value.

Exp 3: alpha = 0.01 .. epochs = 5000 .. order = 6 .. beta = 100 ..

With the inclution of the regularization of beta = 100 for the same values of alpha. Now for this configuration the accuracy is = 49% and the loss 0.51 value.

Exp 3: alpha = 0.001 .. epochs = 5000 .. order = 6 .. beta = 500 ..
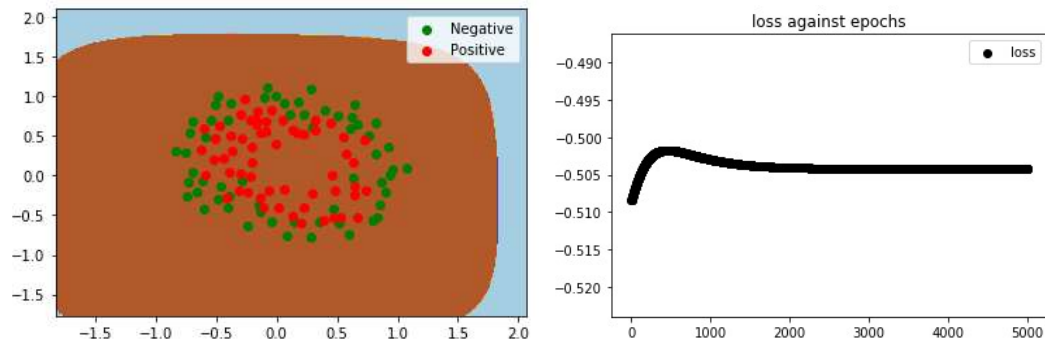
From the above results I have observed that as the value of beta (regularization value) is increasing from 0.1 – 100 or higher. The value of accuracy is being decreased i.e. the model is less fitted. I for the best model fit for this emthod with the value of beta = 0.1 and finetuning the other parameters of number of epochs and the learning rate alpha.