

CSCI 635: Introduction to Machine Learning

Homework 4: Nonlinear Prediction

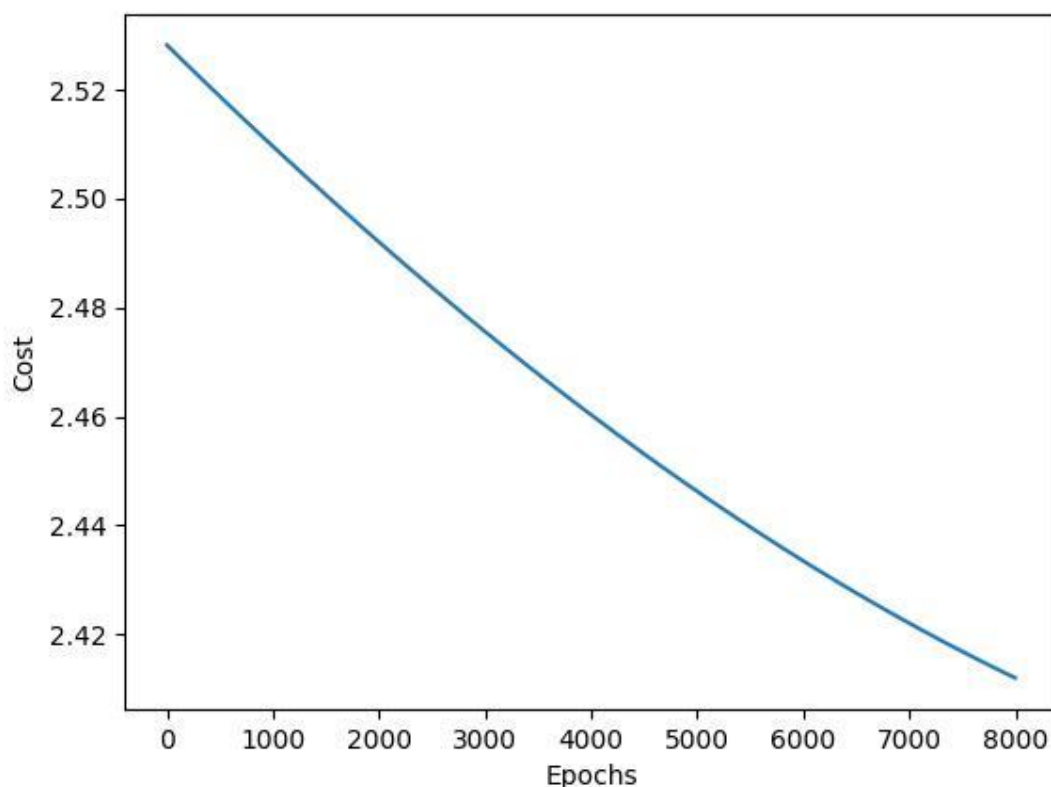
Question 1a

To tackle the XOR problem, first, gradient check was performed on the data and if the check came back true, the data was trained using a MLP model. For the hidden layer and the output layer the loss was calculated and the derivatives of both the weights and biases were calculated.

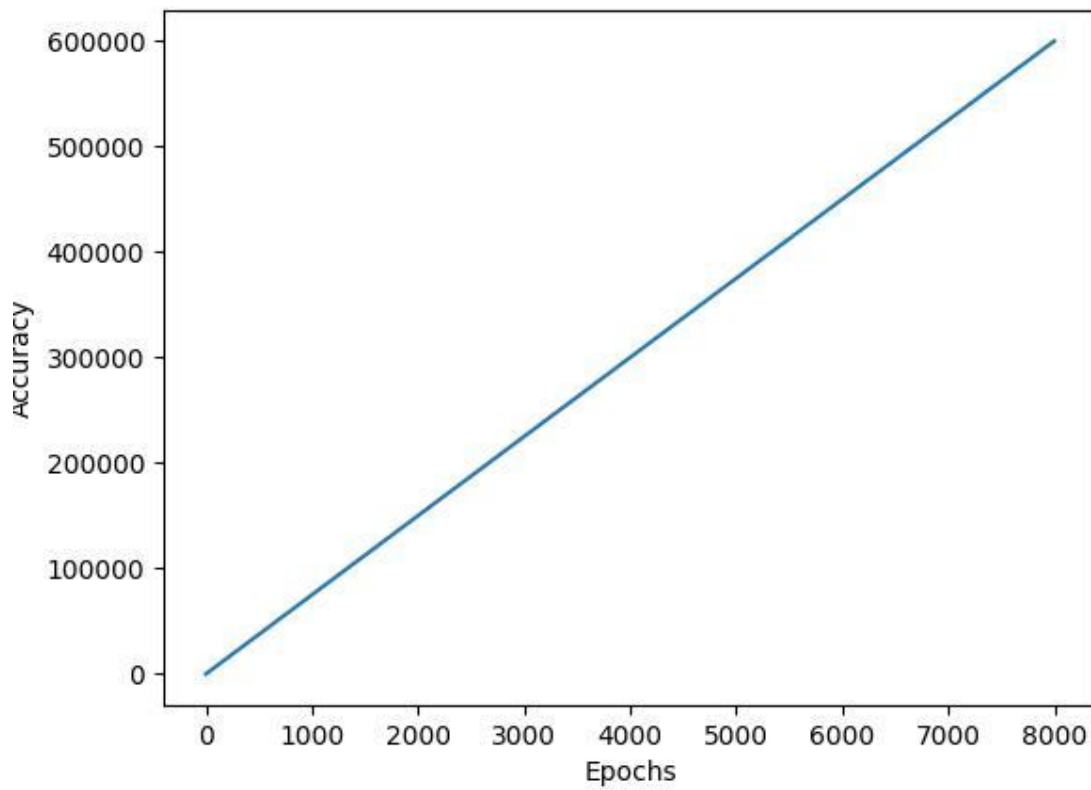
The hyperparameters chose by me was a learning rate of 10^{-4} , weights and bias which is randomly initialized and an epoch of 800. The learning rate was chosen to be that particular value to tell how far to move the weights.

The model gave an accuracy of 75% which means the data fits properly with the model more than half of the time. It's loss per epoch reduces significantly.

Cost function plot



Accuracy plot

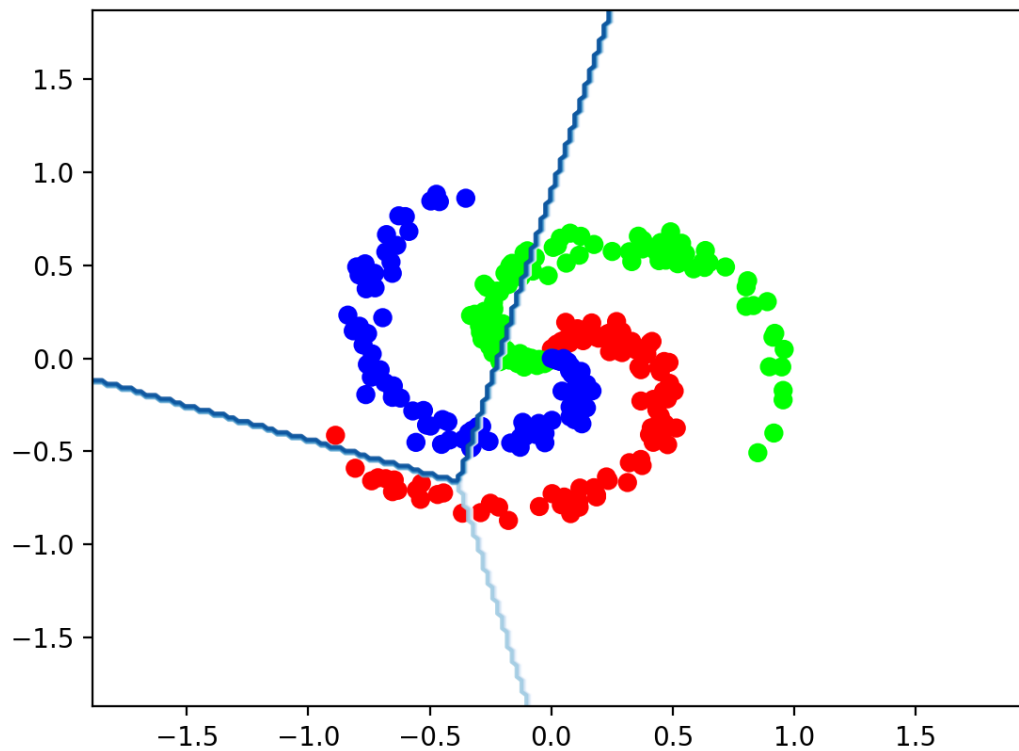


Compared to the cross entropy model, the MLP model gives more accuracy and has more speed making it more efficient.

Question 1b

Decision boundary Plot:

From the plot it is understood that the data does not exactly fit into the model. It fits almost fully correct in class but not exactly a perfect fit.



Accuracy : 57 %