Coding#3 Implement a Multi-Layer perceptron

My neural network could train an AND, OR and XOR Gate with two input nodes and one hidden layer with two nodes. The donut data needs at least three nodes in the hidden layer.

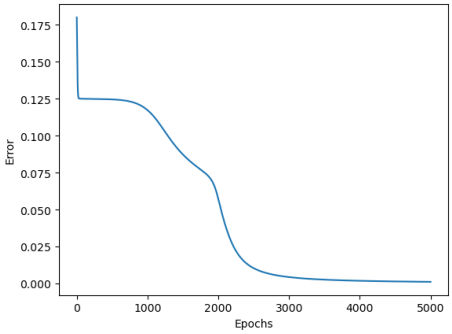
The respective weights are in the weight files.

XOR Gate

For the XOR Gate I had good results with the following hyperparameters:

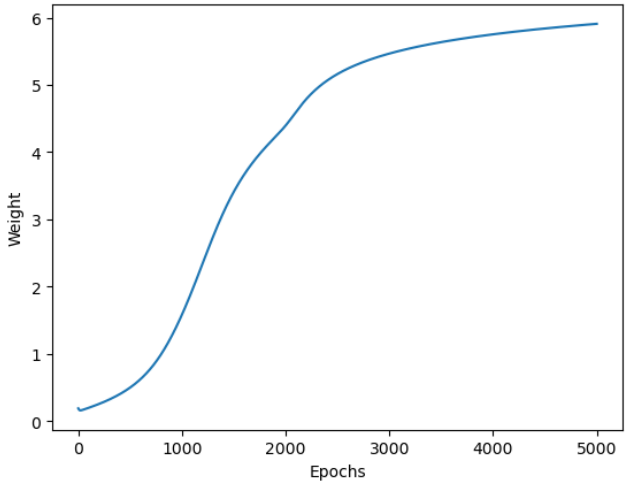
- Hidden layers: 1 (2 perceptron's)
- Learning rate: 0.25
- Number of epochs: 5.000

Loss function:

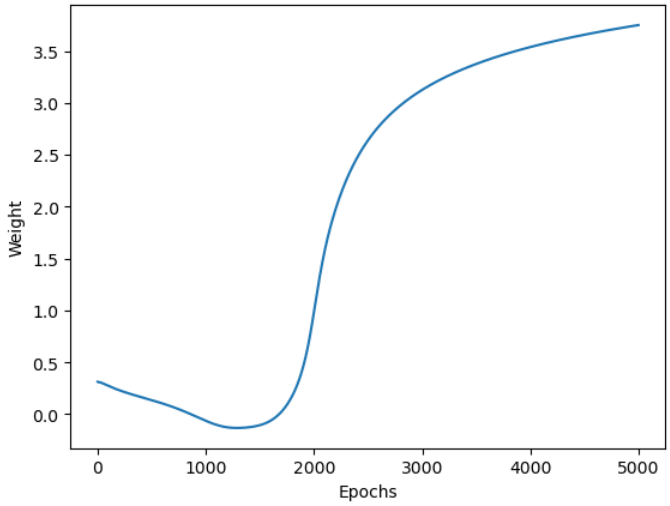


Weight and bias development of the first perceptron in the hidden layer:

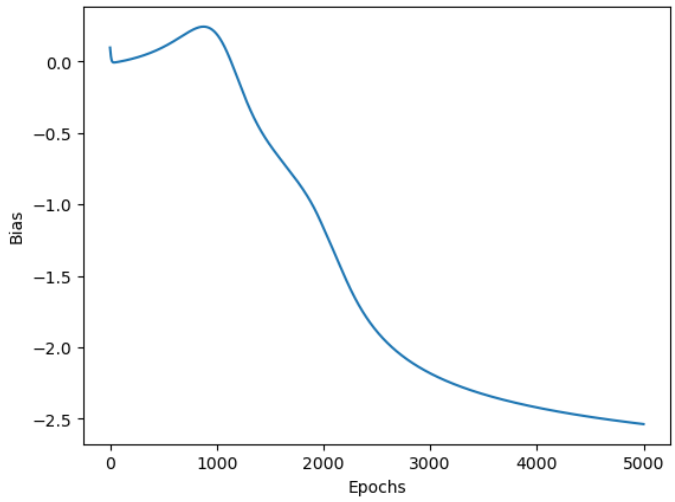
W1:



W2:


Weight
Epochs
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
1000
2000
3000
4000
5000

Bias:

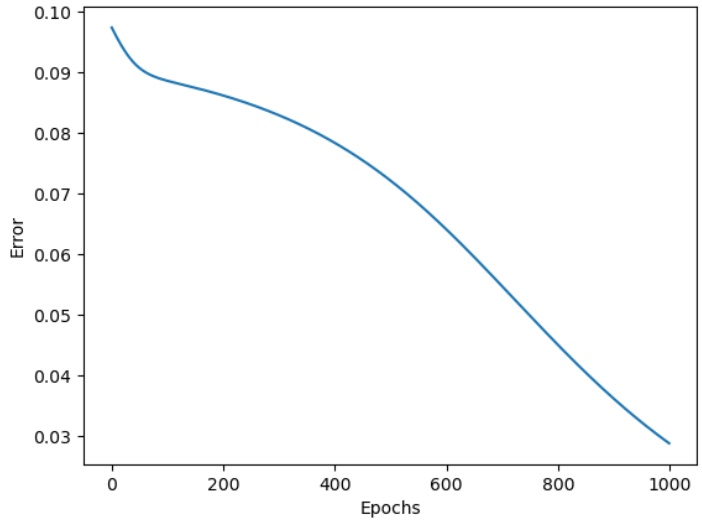

Bias
Epochs
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
0
1000
2000
3000
4000
5000

OR-Gate

For the OR Gate I had good results with the following hyperparameters:

- Hidden layers: 1 (2 perceptron's)
- Learning rate: 0.1
- Number of epochs: 1.000

Loss function

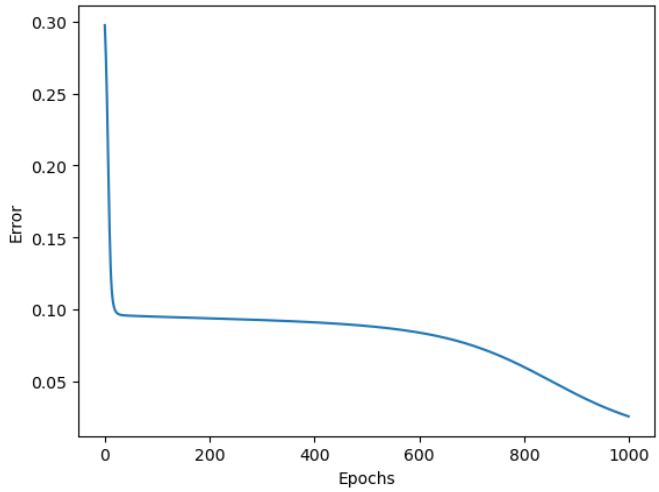


AND-Gate

For the OR Gate I had good results with the following hyperparameters:

- Hidden layers: 1 (2 perceptron's)
- Learning rate: 0.1
- Number of epochs: 1.000

Loss function



Donut-Data

For the donut shaped data I had good results with the following hyperparameters:

- Hidden layers: 1 (3 perceptron's)
- Learning rate: 0.75
- Number of epochs: 10.000

Loss function