

AI/ML - CS337 - Lab Assignment 4

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Part 2.1

Learning Rate = 0.001

Number of hidden layers = 1

Number of nodes in the hidden layer = 4

Batch size = 100

Number of epochs = 50

Input < -----ReLU----- > Hiddenlayer < -----Softmax----- > Output

As we have seen in class, without any hidden layer it is not possible to classify XOR. I have tried using 1,2 and 3 nodes in the hidden layer for various learning rate but didn't give reasonable accuracy.

Part 2.2

Learning Rate = 0.0008

Number of hidden layers = 1

Number of nodes in the hidden layer = 2

Batch size = 25

Number of epochs = 50

Input < -----ReLU----- > Hiddenlayer < -----Softmax----- > Output

This architecture corresponds to min topology because, with only one node in hidden layer or no hidden layers at all, we cannot get non-linear separator. Therefore, we need at least 1 hidden layer with 2 nodes to get non-linearity.

Part 2.3

Learning Rate = 0.001

Number of hidden layers = 0

Batch size = 30

Number of epochs = 20

It is equivalent to just doing softmax regression

Input < -----Softmax----- > Output

Just doing softmax(a.k.a multiclass logistic regression) gives >90% accuracy. Therefore this architecture corresponds to minimum topology with no hidden layers.

Part 2.4

Learning Rate = 0.0009

Number of hidden layers = 2 (1 convolution layer)

Number of filters in convolution layer = 4

Number of nodes in the hidden layer for fully connected NN part = 30

Batch size = 25

Number of epochs = 50

Input1 < ---Convolution--- > Input2 < ---ReLU--- > Hiddenlayer < ---Softmax--- > Output(10)

As usual the downsample input obtained from Convoluton layer is sent as Input to a ReLu and softmax layers. I have tried using just softmax without ReLu, but accuracy is <35% so used both ReLu and softmax like previous parts.