LAB-05 REPORT

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1) TaskSquare Minimal Topology:

   out_nodes = 2
   alpha = 0.01
   batchSize = 32
   epochs = 20
   seed = 42

   nn1.addLayer(FullyConnectedLayer(2, 4, 'relu'))
   nn1.addLayer(FullyConnectedLayer(4, 2, 'softmax'))
   Test Accuracy 99.3 %

   It is minimal because when I reduce out-noded to 3 in the relu layer, it is not able to separate data properly for all seeds.

2) TaskSemiCircle Minimal Topology:

   out_nodes = 2
   alpha = 0.03
   batchSize = 16
   epochs = 25
   seed = 42

   nn1.addLayer(FullyConnectedLayer(2, 4, 'relu'))
   nn1.addLayer(FullyConnectedLayer(2, 2, 'softmax'))
   Test Accuracy 98.6 %

   It is minimal because when I reduce out-nodes to less than 4 in the relu layer, I was getting test accuracy ~ 96% and sometimes less.

3) TaskMNIST:

   out_nodes = 2
   alpha = 0.003
   batchSize = 32
   epochs = 20
   seed = 42

   nn1.addLayer(FullyConnectedLayer(784, 14, 'relu'))
   nn1.addLayer(FullyConnectedLayer(14, 10, 'softmax'))

Test Accuracy 94.58 %

Without using softmax only I was getting ~90% accuracy. After adding relu with 10 out-nodes accuracy got dropped to 70%. With the increase in nodes accuracy increases. With out-nodes less than 15 accuracy was ~94% but sometimes less so I kept 16 out-nodes in relu.

4) TaskCIFAR10:

```
out_nodes = 10
alpha = 0.01
batchSize = 8
epochs = 24
seed = 42

nn1.addLayer(ConvolutionLayer([3, 32, 32], [4, 4], 8, 2))
nn1.addLayer(AvgPoolingLayer([8, 15, 15], [3, 3], 2))
nn1.addLayer(FlattenLayer())
nn1.addLayer(FullyConnectedLayer(7*7*8,20, 'relu'))
nn1.addLayer(FullyConnectedLayer(25, 10, 'softmax'))
```

Test Accuracy 38.3 %

I'm unable to comment on its minimality a lot as It would have taken days of training to find a minimal topology though on a average this model gives a good results on most seeds.