Report

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Model and Implementation –

A fully connected dense neural network is used here. 2 variants have been used one with 1 hidden layer and other with 2 hidden layers.

Steps to train the neural networks –

1. Forward Propagation
2. Cost Calculation
3. Backpropagation (Computing Gradients)
4. Applying the gradients to correct positions with appropriate learning rate
5. Repeat till convergence

Data was preprocessed for better results. Following operations were carried out on it –

- Targets were 0 indexed
- Normalization
- Divided into mini batches during training

Learning rate decay was used for better results, also we used 3 different starting learning rates.

Hyper-parameters –

2 Hidden Layers

Input layer has 6 units as there are 6

attributes. 1st Hidden Layer has 256 units.

2nd Hidden Layer has 128 units.

Output Layer has 10 units as there are 10 classes.

The hidden layers have relu activation and the output layer has softmax

activation. Batch size = 128 (Mini Batch Gradient Descent).

Learning rates = 0.1, 0.01, 0.001

Optimizer = Adam Regularization = L2

1 Hidden Layer

Input layer has 6 units as there are 6 attributes. 1st Hidden Layer has 256 units.

2nd Hidden Layer has 128 units.

Output Layer has 10 units as there are 10 classes.

The hidden layer have relu activation and the output layer has softmax

activation. Batch size = 128 (Mini Batch Gradient Descent).

Learning rates = 0.1, 0.01,

0.001 Optimizer = Adam

Regularization = L2

Metrics –

2 Hidden Layers

Maximum Train accuracy = 84%

Maximum Test Accuracy = 80%

Loss = 0.38

This is for a network with 256 and 128 hidden layer units. The learning rate is 0.01.

1 Hidden Layer

Maximum Training Accuracy = 79%

Maximum Testing Accuracy = 74%

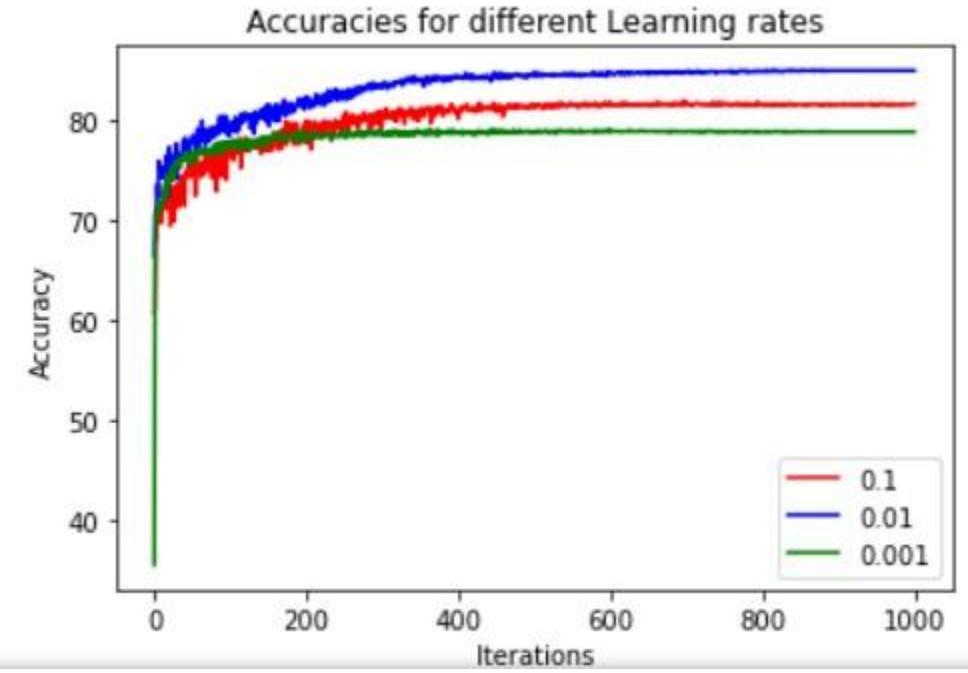
Loss = 0.53

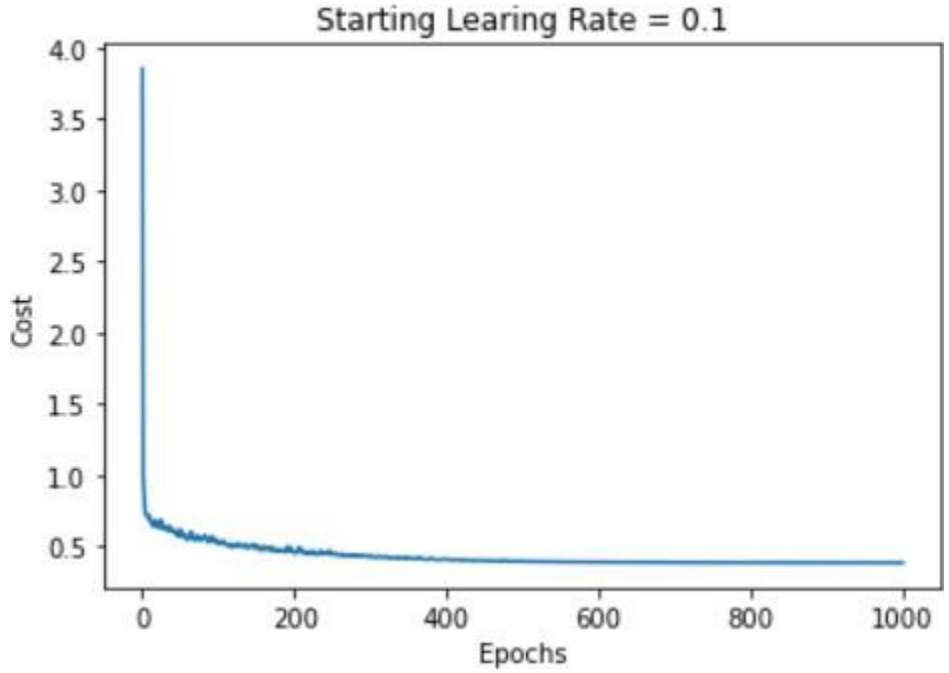
This is for a network with 128 hidden layer units.

The learning rate is 0.01.

Plots –

Neural Network with 2 hidden layers –





Neural Network with 1 hidden layer –