**Output of the program execution:**

====================================================================================================

Inputs to initialize the neural network:

Enter the number of layers for neural network: 2

Enter the number of neurons for hidden-layer 1: 50

Enter the number of neurons for output-layer: 10

====================================================================================================

Initializing Feed-Forward Neural Network ...

Training Feed-Forward Neural Network ...

Error on Training and Testing Set: Before Training

Error Fraction on training: 1.0

Error Fraction on testing: 0.9

====================================================================================================

Epoch 1:

Error Fraction on training: 0.99

Error Fraction on testing: 0.245

====================================================================================================

Epoch 2:

====================================================================================================

Epoch 3:

====================================================================================================

Epoch 4:

====================================================================================================

Epoch 5:

====================================================================================================

Epoch 6:

====================================================================================================

Epoch 7:

====================================================================================================

Epoch 8:

====================================================================================================

Epoch 9:

====================================================================================================

Epoch 10:

Error Fraction on training: 0.386

Error Fraction on testing: 0.102

====================================================================================================

Epoch 11:

====================================================================================================

Epoch 12:

====================================================================================================

Epoch 13:

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Epoch 14:

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Epoch 15:

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Epoch 16:

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Epoch 17:

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Epoch 18:

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Epoch 19:

====================================================================================================

Epoch 20:

Error Fraction on training: 0.2165

Error Fraction on testing: 0.102

====================================================================================================

Epoch 21:

====================================================================================================

Epoch 22:

====================================================================================================

Epoch 23:

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Epoch 24:

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Epoch 25:

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Epoch 26:

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Epoch 27:

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Epoch 28:

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Epoch 29:

====================================================================================================

Epoch 30:

Error Fraction on training: 0.1245

Error Fraction on testing: 0.105

====================================================================================================

Epoch 31:

====================================================================================================

Epoch 32:

====================================================================================================

Epoch 33:

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Epoch 34:

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Epoch 35:

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Epoch 36:

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Epoch 37:

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Epoch 38:

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Epoch 39:

====================================================================================================

Epoch 40:

Error Fraction on training: 0.0565

Error Fraction on testing: 0.101

====================================================================================================

Epoch 41:

====================================================================================================

Epoch 42:

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Epoch 43:

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Epoch 44:

====================================================================================================

Epoch 45:

====================================================================================================

Epoch 46:

====================================================================================================

Epoch 47:

====================================================================================================

Epoch 48:

====================================================================================================

Epoch 49:

====================================================================================================

Epoch 50:

Error Fraction on training: 0.049

Error Fraction on testing: 0.106

====================================================================================================

Epoch 51:

====================================================================================================

Epoch 52:

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Epoch 53:

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Epoch 54:

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Epoch 55:

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Epoch 56:

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Epoch 57:

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Epoch 58:

====================================================================================================

Epoch 59:

====================================================================================================

Epoch 60:

Error Fraction on training: 0.016

Error Fraction on testing: 0.103

====================================================================================================

Epoch 61:

====================================================================================================

Epoch 62:

====================================================================================================

Epoch 63:

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Epoch 64:

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Epoch 65:

====================================================================================================

Epoch 66:

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Epoch 67:

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Epoch 68:

====================================================================================================

Epoch 69:

====================================================================================================

Epoch 70:

Error Fraction on training: 0.0165

Error Fraction on testing: 0.105

====================================================================================================

Epoch 71:

====================================================================================================

Epoch 72:

====================================================================================================

Epoch 73:

====================================================================================================

Epoch 74:

====================================================================================================

Epoch 75:

Error Fraction on training: 0.01

Error Fraction on testing: 0.101

====================================================================================================

Plotting Error Fraction of the Neuron

====================================================================================================

Predicting over training and testing set:

====================================================================================================

Confusion Matrix on Training Set:

0 1 2 3 4 5 6 7 8 9

0 391 0 1 1 0 1 4 0 0 2

1 0 390 1 2 2 1 1 1 2 0

2 0 5 370 3 3 1 1 7 5 5

3 0 0 4 382 0 7 1 4 1 1

4 1 0 1 2 384 0 2 0 2 8

5 4 0 0 6 1 378 3 2 4 2

6 2 3 2 0 2 0 390 0 1 0

7 7 1 4 0 3 1 1 376 3 4

8 0 2 2 6 2 3 2 1 379 3

9 1 2 0 4 11 3 1 2 4 372

====================================================================================================

Confusion Matrix on Testing Set:

0 1 2 3 4 5 6 7 8 9

0 93 0 0 0 0 0 4 0 2 1

1 0 96 0 3 0 0 0 1 0 0

2 0 1 83 2 2 0 1 5 6 0

3 0 1 5 88 1 1 0 2 2 0

4 0 0 1 0 87 0 4 1 0 7

5 0 0 0 2 0 93 1 1 2 1

6 1 0 1 0 1 0 97 0 0 0

7 0 2 1 0 1 0 0 92 0 4

8 1 1 1 3 2 1 2 1 85 3

9 1 1 0 1 7 2 0 3 0 85

Process finished with exit code 0