

BT3041 – Analysis and Interpretation of Biological Data

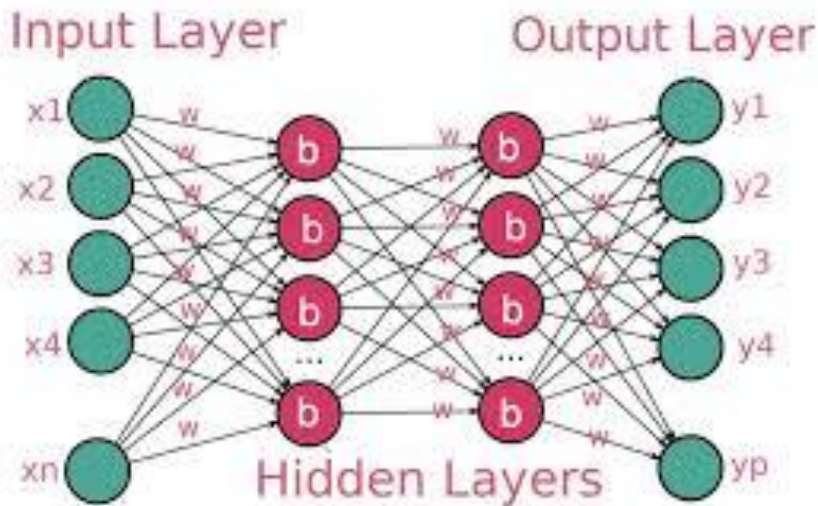
Assignment -2

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The solution to this question is coded using Python.

1.a,b Network Architecture , Number and type of Layers Used



The constructed network comprises of 5 layers

Layer 1 : 784 perceptrons

Layer 2: 500 perceptrons

Layer 3: 250 perceptrons

Layer 4: 25 perceptrons

Layer 5: 10 perceptrons

Number of epochs: 32

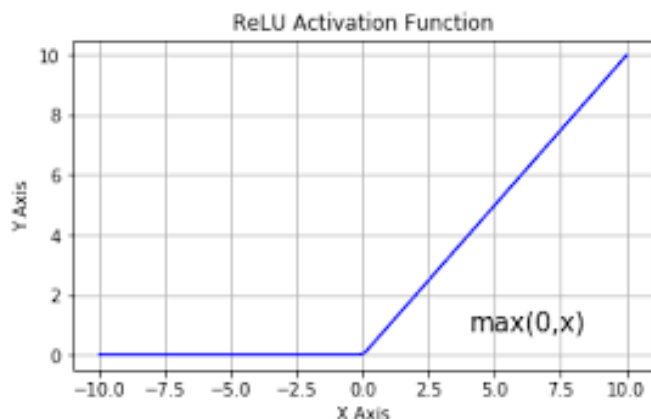
Batch size used to split test data: 10

1.c Activation function used

Rectified Linear Unit (ReLU) function is used.

ReLU formula is $f(x) = \max(0, x)$

If the function receives any negative input, it returns 0; however if the function receives any positive value x , it returns that value. As a result, the output has a range of 0 to infinite.



1.d Loss function used

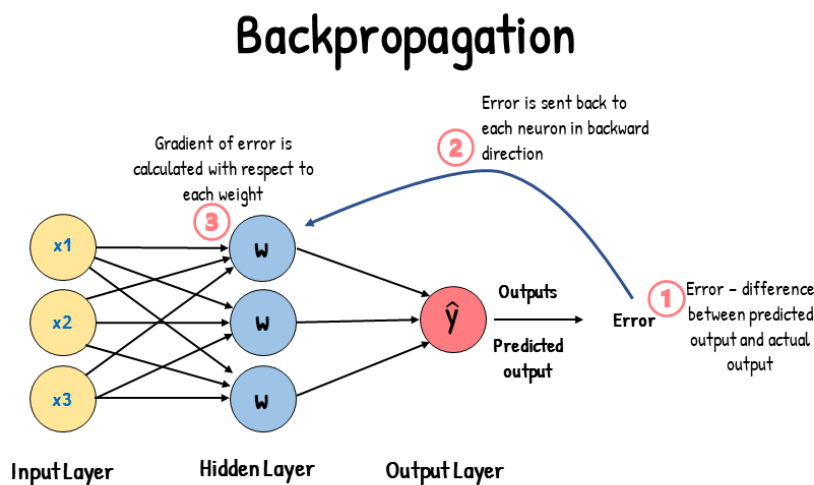
Cross entropy function is used

$$\text{Loss} = -\frac{1}{\text{output size}} \sum_{i=1}^{\text{output size}} y_i \cdot \log \hat{y}_i + (1 - y_i) \cdot \log (1 - \hat{y}_i)$$

also known as logistic, logarithmic, or logarithmic loss. Each class's predicted probability is compared to the actual class's desired output, which can be either 0 or 1, and a score/loss is calculated that penalises the probability based on how far it deviates from the actual expected value.

1.e Learning algorithm used

Backpropagation algorithm



An technique called backpropagation, also known as backward propagation of mistakes, is created to check for errors as they travel backward from input nodes to output nodes. For data mining and machine learning to increase the precision of predictions, it is a crucial mathematical tool.

1.f Learning rate

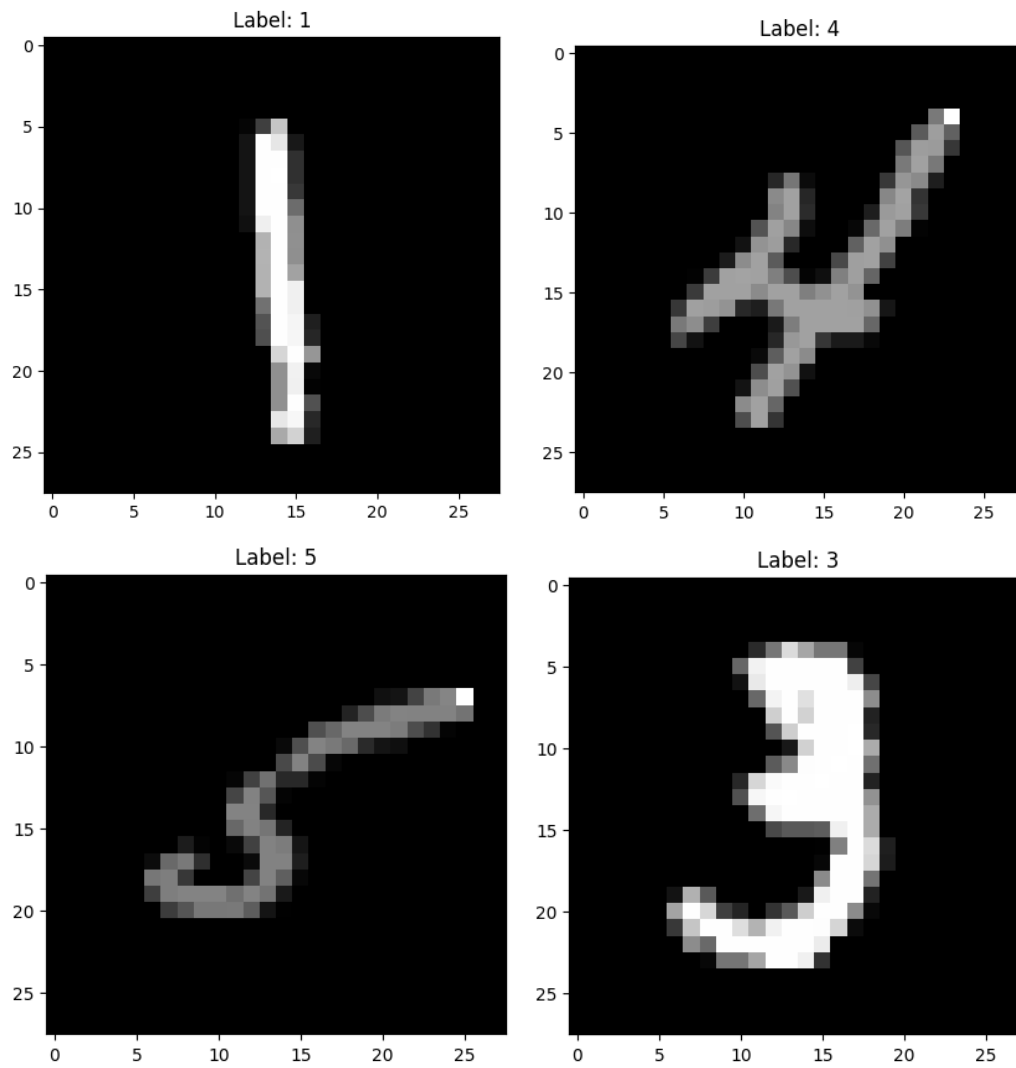
Learning rate 0.01

1.g Loss and accuracy for testing dataset

Test set loss 0.47%

Test accuracy 100.0%

Results:



Graphs plotted with respect to training and testing accuracy

