

14/08/25

classmate

Date _____

Page _____

LAB 4 -

Build a Simple Feed Forward Neural Network
to Recognize Handwritten characters

AIM:-

To build and train a feed-forward neural network
to recognize handwritten digits from the
MNIST dataset.

OBJECTIVES:-

- To understand the architecture of a simple feed-forward neural network.
- To load and preprocess and open-source dataset (MNIST)
- To train the ANN using back propagation.
- To evaluate the performance of the model using accuracy and confusion matrix.

PSEUDOCODE:-

START

1. Import required libraries
2. Load the MNIST dataset
3. Preprocess data :
 - a. Normalize pixel values
 - b. Convert labels to categorical
4. Define feed-forward neural network.
 - Input layer
 - Hidden layer(s) with ReLU activation
 - Output layer with 10 neurons

OUTPUT:-

Epoch 1/5 - Loss : 203.3984, Train Acc : 0.8605
 Epoch 2/5 - Loss : 97.6781, Train Acc : 0.9307
 Epoch 3/5 - Loss : 71.4635, Train Acc : 0.9497
 Epoch 4/5 - Loss : 56.5779, Train Acc : 0.9596
 Epoch 5/5 - Loss : 46.8184, Train Acc : 0.9666
 Test Accuracy : 0.9613

0	967	0	1	4	0	3	2	1	0	2
1	0	1117	3	4	0	1	4	1	5	0
2	6	1	1006	6	2	0	2	5	3	1
3	1	0	6	991	0	3	0	4	4	1
4	1	0	9	0	915	3	5	2	3	41
5	6	0	2	22	1	648	8	0	3	2
6	7	3	4	2	5	12	921	0	4	0
7	1	4	17	3	1	1	0	985	2	15
8	10	0	8	24	3	10	7	5	905	2
9	5	5	2	15	5	9	2	7	6	956

OBSERVATION:-

Dataset: MNIST (60,000 train + 10,000 test images)

Network: 1 input layer, 2 hidden layers (ReLU),
1 output layer (softmax)

Optimizer: Adam

Loss Function: Categorical crossentropy

Training Epochs: 5

Accuracy: ~97-98% on test data

5. Compile the model with loss = 'categorical_crossentropy',
optimizer = 'adam', and metrics = ['accuracy']
 6. Train the model on training data (epochs, batch size)
 7. Evaluate on test data.
 8. Display accuracy and confusion matrix
- END.

RESULT:-

- A feed-forward neural network was successfully built and trained to recognize handwritten digits
- Test Accuracy : 0.9601