LAB-4

14/08/25

Build a simple feed forward neural network to recognize handwritten character. (MINST Dataset)

*Aim :-

To design and implement a simple feed-forward neural network (using keras/Tensorflow) for recognizing handwritten digits from the MNIST dataset and evaluate it's performance.

*objective :-

1. To understand the architecture of the feed-Forward neural network.

2. To apply supervised learning for image classification

3. To preprocess the MINIST dataset for neural network training

4. To evaluate the model's accuracy and analyze performance.

*pseudocode :-

START

Import required libraries

Load MNIST dataset

Normalize pixel values between 0 & 1

flatten 28X28 images into vectors

One-hot encode the labels

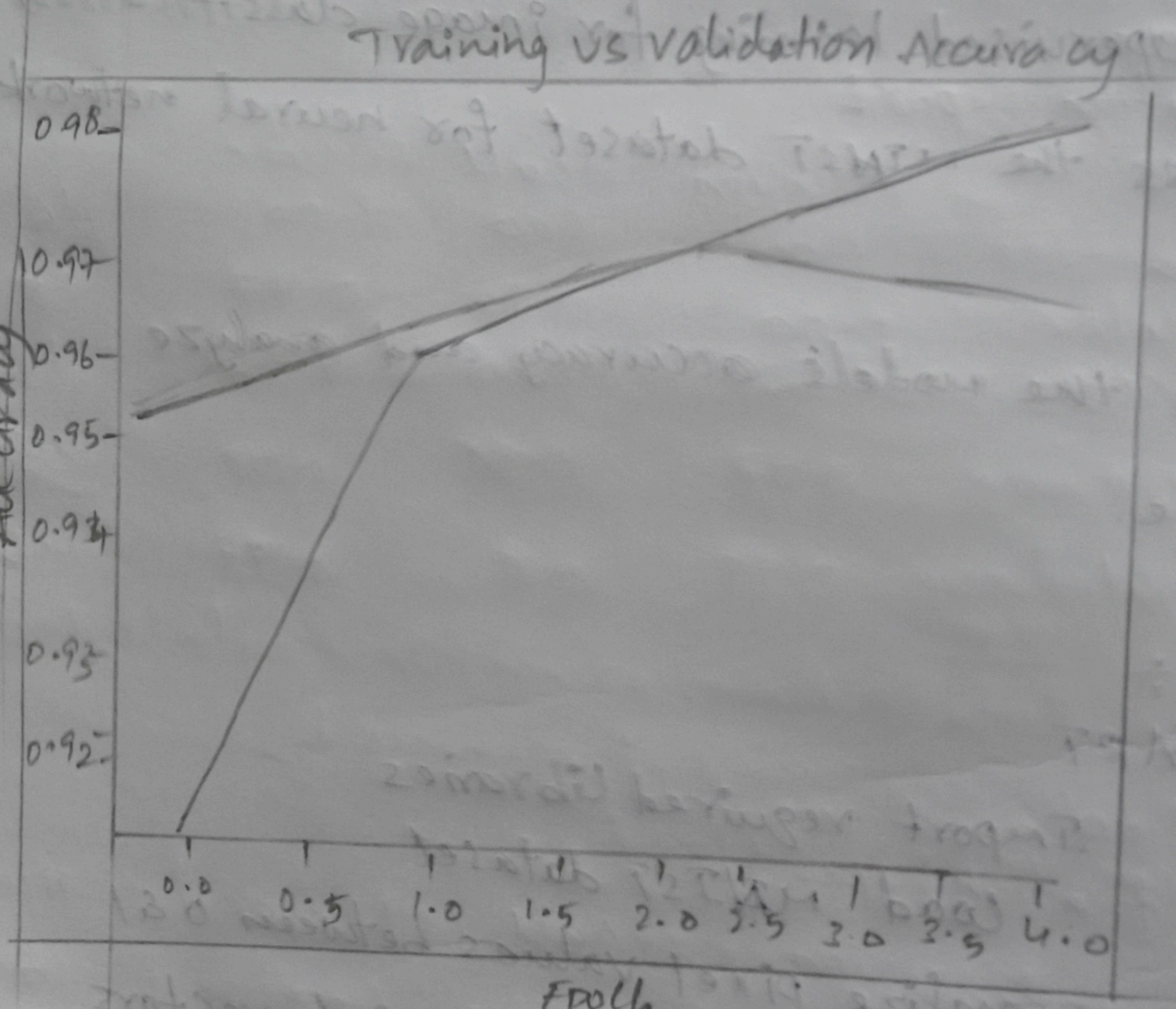
Define a sequential neural network,

Input layer: size 784

Hidden layer: 128 neurons, softma

activatio

Epoch [1/5], Train ACC: 0.9189, val ACC: 0.9535
Epoch [2/5], Train ACC: 0.9620, val ACC: 0.9632
Epoch [3/5], Train ACC: 0.9732, val ACC: 0.9732
Epoch [4/5], Train ACC: 0.9799, val ACC: 0.9758
Epoch [5/5], Train ACC: 0.9838, val ACC: 0.9761



Compile model with Adam optimizer, categorical crossentropy loss, accuracy metric

Train model using training dataset for defined epochs

Evaluate the model on the test set and print accuracy

Save the model to a file (optional).

END

* Observation :=

→ Dataset MNIST, containing 60,000 training images and 10,000 testing images of size 28X28 pixels

→ Normalization greatly improved training speed and accuracy

→ Model performance after 5 epochs:

→ Training Accuracy : 95.61.

→ Validation Accuracy: 97.71.

→ Test Accuracy : 97.73%.

→ loss steadily decreased during training, indicating proper learning.

* Conclusion :=

The feed-forward neural network successfully recognized handwritten digits from the MNIST dataset with high accuracy (~97-98%) proving that even simple architectures can perform well on basic image classification.