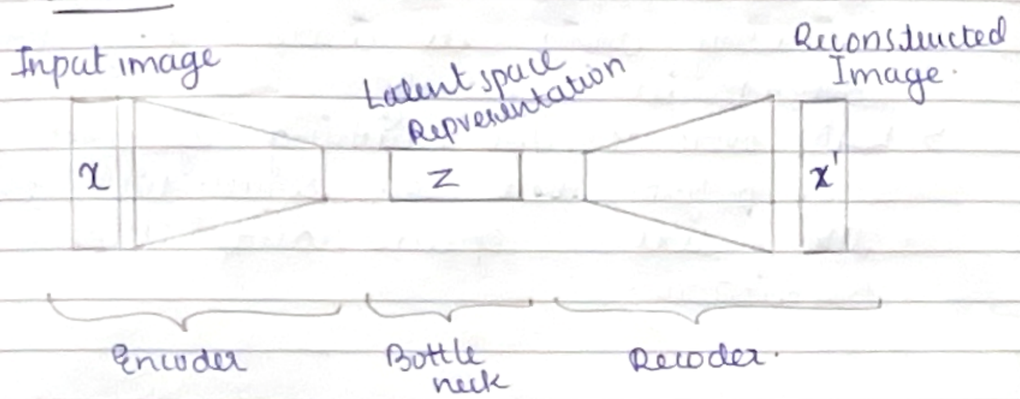
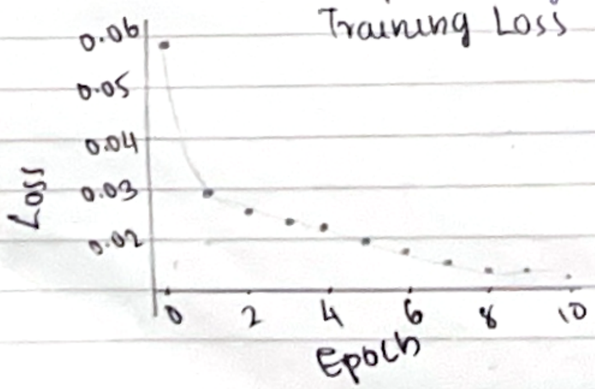
AUTOENCODERS



OUTPUT:

Epoch 1/10 Loss: 0.0580 Accuracy : 94.20%.
Epoch 2/10 Loss: 0.0295 Accuracy : 97.05%.
Epoch 3/10 Loss: 0.0251 Accuracy : 97.49%.
Epoch 4/10 Loss: 0.0222 Accuracy : 97.78%.
Epoch 5/10 Loss: 0.0199 Accuracy : 98.01%.
Epoch 6/10 Loss: 0.185 Accuracy : 98.15%.
Epoch 7/10 Loss: 0.0176 Accuracy : 98.24%.
Epoch 8/10 Loss: 0.168 Accuracy : 98.32%.
Epoch 9/10 Loss: 0.0159 Accuracy : 98.41%.
Epoch 10/10 Loss: 0.0152 Accuracy : 98.48%.



17/10/25

LAB-10

Perform Compression on MNIST dataset using AUTO ENCODER

AIM:

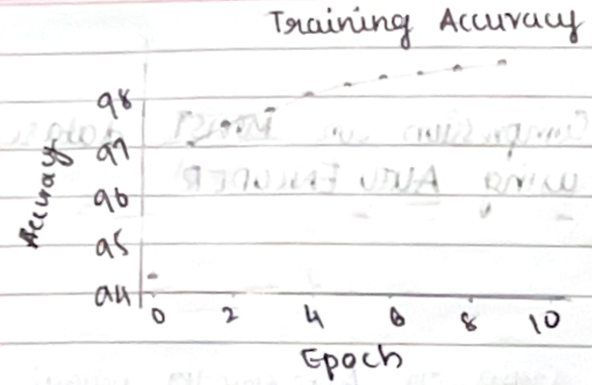
To build and train an Autoencoder neural network using MNIST dataset for reconstruction

OBJECTIVES:

1. To understand the working of Autoencoders –
2. To learn how to implement encoder and decoder networks using PyTorch.
3. To visualize and compare the original vs reconstructed images
4. To analyze how loss and accuracy vary during training.

PSEUDOCODE:

1. Import required libraries
2. Load Dataset
3. Create DataLoader for batch processing
4. Define Autoencoder class:
   - Encoder : Compress 28x28 input → 128 → 64 → 16 features
   - Decoder: Reconstruct 16 → 64 → 128 → 28x28 output
   - Act. fun : ReLU for hidden layers, Sigmoid for O/P
5. Initialize model, define loss (MSE Loss) and optimizer (Adam)
6. For each epoch:
   a. Forward pass - encode and decode input
   b. Compute reconstruction loss
   c. Backward pass and update weights



OBSERVATION:

> As epochs progress, training loss decreases, showing the model is learning to reconstruct images more accurately.
> The reconstructed images gradually resemble the original MNIST digits
> Accuracy is estimated indirectly from reconstruction loss (unsupervised)

d. Record average loss and accuracy per epoch.
7. Plot Training loss and accuracy.
8. Reconstruct a few sample images and visualize:
   - Top row : Original
   - Bottom : Reconstructed

Autoencoder is an unsupervised neural network used for feature learning, noise reduction and dimensionality reduction.
Encoder: Compress input data into a smaller latent representation
Decoder: Reconstructs the input from the latent representation

RESULT:

The Autoencoder model successfully learned compressed representations of MNIST digits and reconstructed them with minimal loss.