

RA2311047010016

S.No	Date	Title	Signature
9.	30.09.2025	Building a RNN	30/9 write neatly
8	09.10.2025	Long Short Term Memory	9/10/25
10.	17.10.2025	perform compression using airist dataset using auto encoders	
11.	17.10.2025	Experiment using Variations (VAE)	
12	27.10.2025	Implement a Deep convolutional GAN to generate color Images	copy
13	27.10.2025	Understanding the Architecture of a pre-trained model	
14	27.10.2025	Implement a pre-trained CNN model as a feature extractor	
15	27.10.2025	Implement a Yolo model object detection	copy

Completed
3/11/25

Lab-11. Experiment using variations (VAE)

Aim: To implement a variational autoencoder VAE and study its generative ability to reconstruct.

Observation
Objective:

To understand the concept and working of variational autoencoders.

To perform unsupervised feature learning using probabilistic latent space representation

To train a VAE model that learns both encoding and decoding

pseudocode.

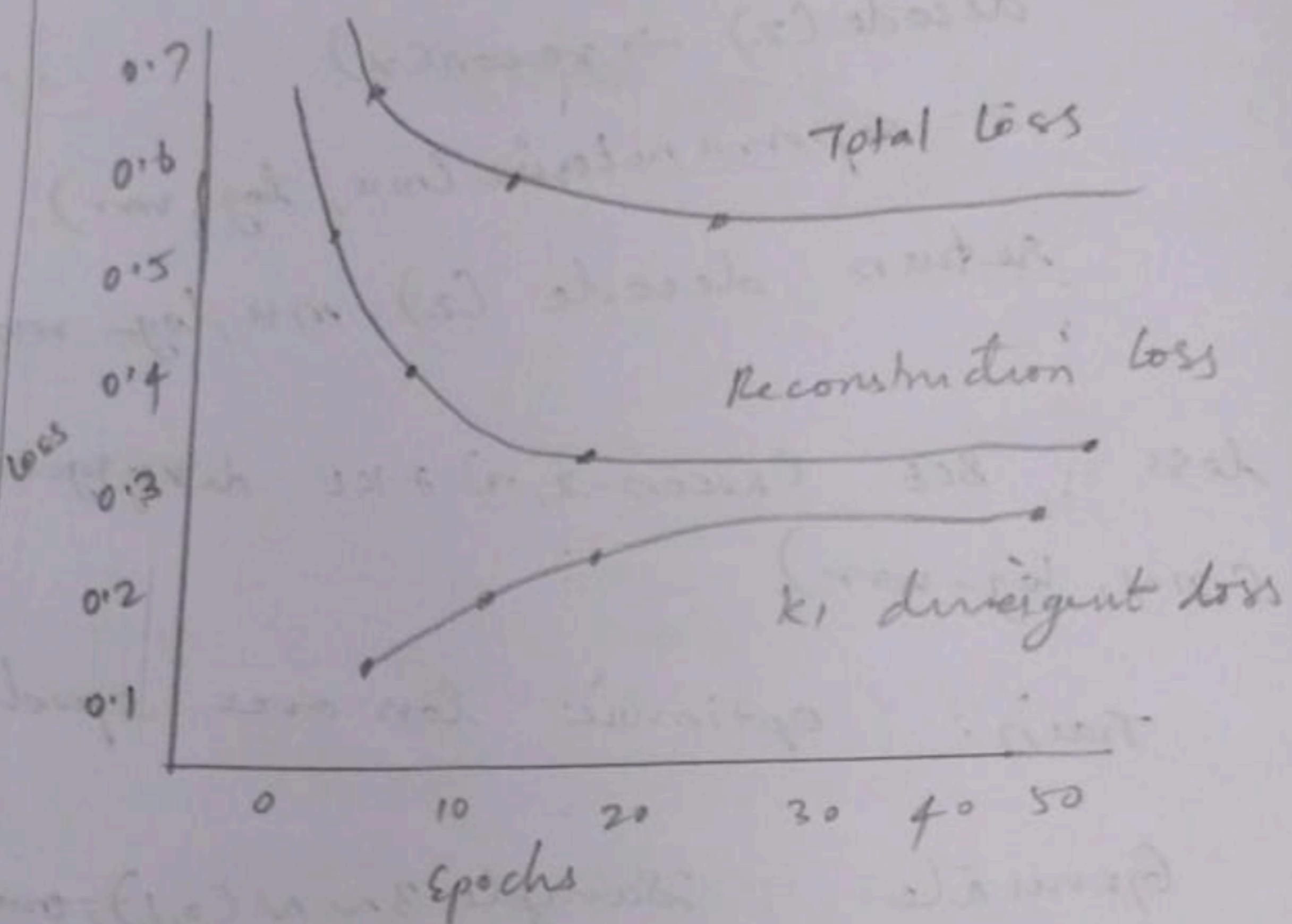
Import torch, torchvision
Load mnist dataset or normalize.

epoch	Reconstruction Loss	KL Divergence	Total/ Loss
1	loss 0.65	0.10	0.75
5	0.45	0.15	0.60
10	0.25	0.20	0.55
20	0.15	0.25	0.55
50	0.125	0.28	0.53

Result :-

The experiment using VAE is successfully verified.

VAE training loss over epoch



Output

1	0.65	0.10	0.75
5	0.45	0.15	0.60
10	0.35	0.20	0.55
20	0.30	0.25	0.55
50	0.25	0.28	0.53

class VAE ::

encode (x) $\rightarrow \mu, \log-\text{var}$

reparameterize ($\mu, \log-\text{var}$) $\rightarrow z$

decode (z) $\rightarrow \text{recon}(x)$

$z = \text{reparameterize}(\mu, \log, \text{var})$

return decode (z), $\mu, \log-\text{var}$

loss : BCE ($\text{recon}-z, z$) + KL divergence
 $(\mu, \log-\text{var})$

Train : optimise loss over epoch.

Generate : Sample $z \sim N(0,1)$, output
decode (z)

Observations :

learns smooth latent space

Balance reconstruction and
regularization

Generate new samples by
decoding random latent.

NAE Architecture

