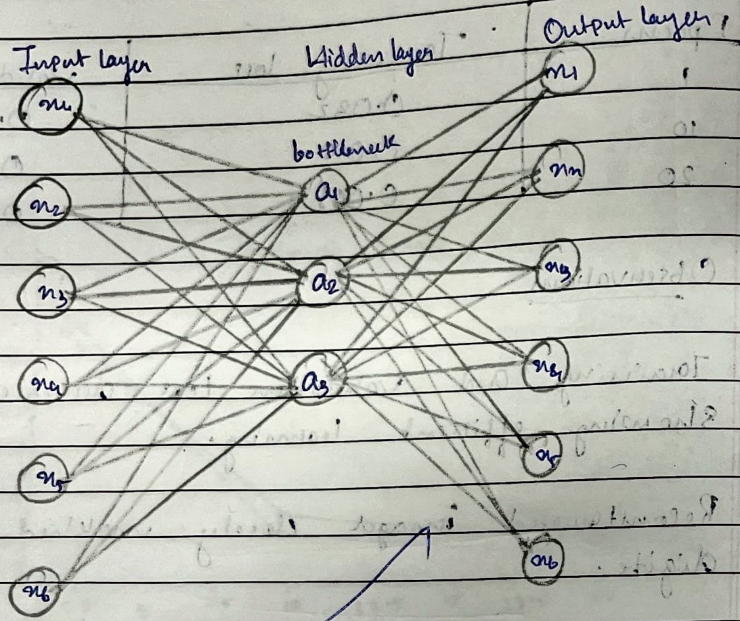
VAE Architecture :



17.10.25

Lab

Exp 11. Experiment Using Variations (VAE)

Aim: To implement a Variational Autoencoder (VAE) and Study its generative ability to reconstruct.

Objective:

* To understand the concept and working of variational autoencoder.
* To perform unsupervised feature learning using probabilistic latent space representation.
* To train a VAE model that learn both encoding ~~and~~ decoding.
* To visualize the latent space and generate new images by sampling from it.

PSEUDOCODE:

BEGIN:

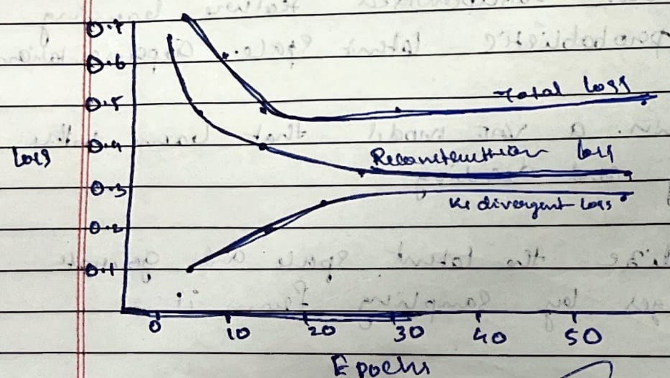
Import torch, torchvision.

load MNIST dataset and normalize

Class VAE :

Epoch	Reconstruction	KL Divergance	Total loss
1	0.68	0.00	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

VAE traing loss Over Epochs



decode(z) -> recon(x)

z = reparameterize(mu, log_var)

return decode(z); mu, log_var

loss = BCE(recon_x, x) + KL divergence (mu, log_var)

Train: Optimize loss over epochs.

Generate: Sample z ~ N(0, I), Output decode(z)

Observations:

- Learns smooth latent space.
- Balances reconstruction and regularization.
- Generate new samples by decoding random latent

Epoch	Reconstruction loss	KL Divergence loss	Total loss
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

Result:

∴ The Experiment using VAE is successfully implemented.