

TUE
16/9/25

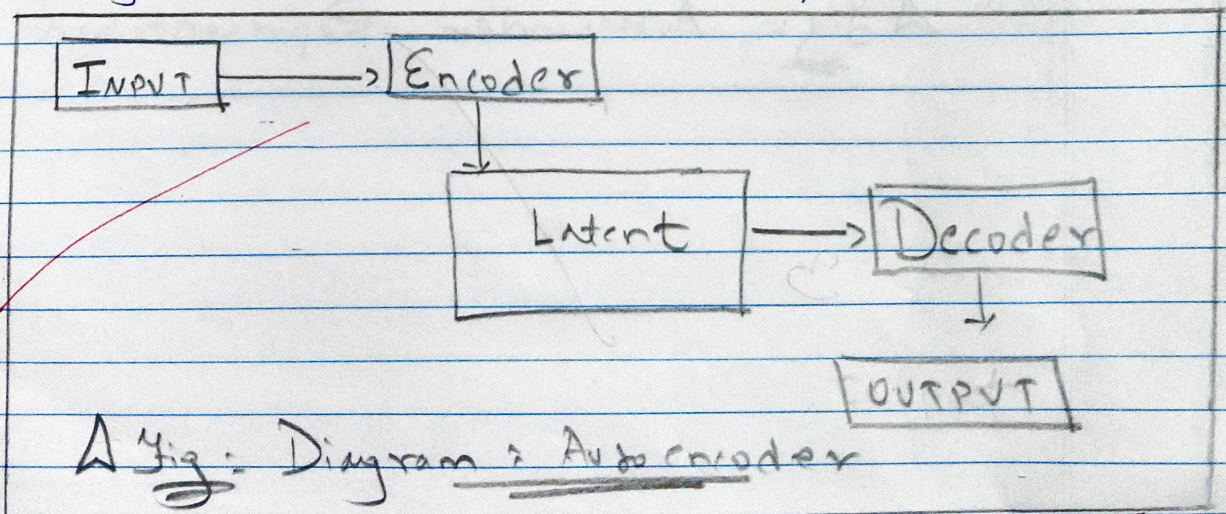
① Explain the working of an Autoencoder with neat diagram.

② What is reparameterization trick, why is essential in VAE, prove mathematically how it enables back propagation through stochastic variables.

③ What is role of KL divergence in VAE, & write down limitations of VAE.

Answers

① An Autoencoder mainly consists of: Encoder and Decoder. As its name suggests, it compresses the data, for processing to be done by encoder & the regeneration/reconstruction for Decoder to generate the desired output.



Autocoder Consists of :

Encoder : con. encoding, i.e., compressing the given input for further processing.

Decoder : decoding, i.e., reconstructing the processed data from encoder & generating the output.

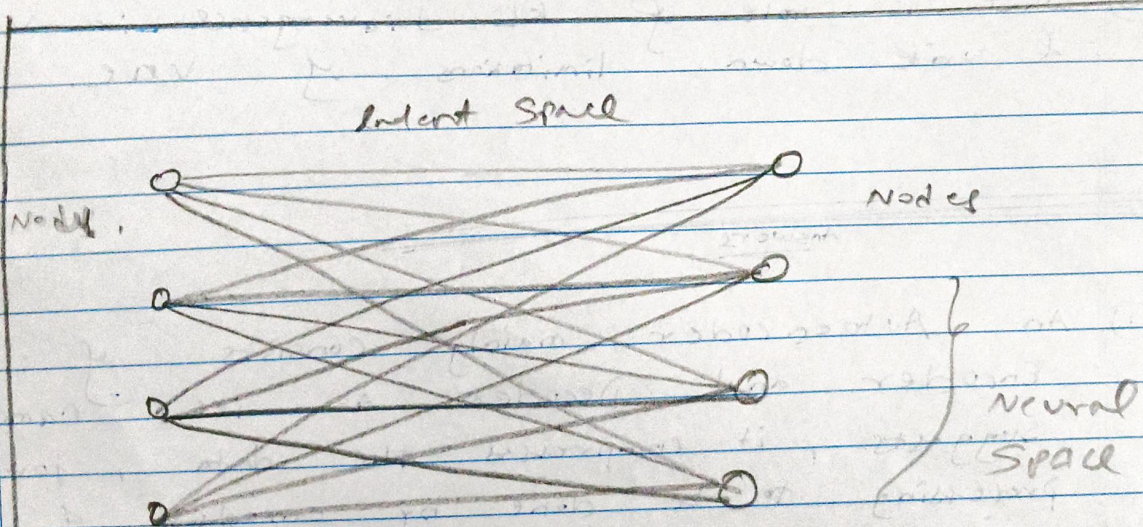


Fig. Autoencoder Representation.

② Reparameterization : It is very essential
in Variational Autoencoders

It is responsible for enabling back
propagation through SLD, i.e.,
Stochastic Gradients, which in turn
are nothing but, stochastic
variables.

③ KL divergence.

1. Learned latent distribution is close to prior distribution.
2. How probability distribution differs from another is ensured by KL divergence.
3. A VAE: Variational Auto Encoder tries to learn latent distribution that approximate to be true.

loss function (ELBO - Evidence Lower Bound).

Here, KL divergence ensures smooth, continuous and structured space.

Limitations:

1. Output is Blurry:

In vae, sometimes due, output is not clear.

2. Over Regularization

In vae, input is not clearly interpreted

which leads to posterior collapse, which we simply call over regularization.

3. Choice of Prior.