ENGR 4350: Applied Deep Learning

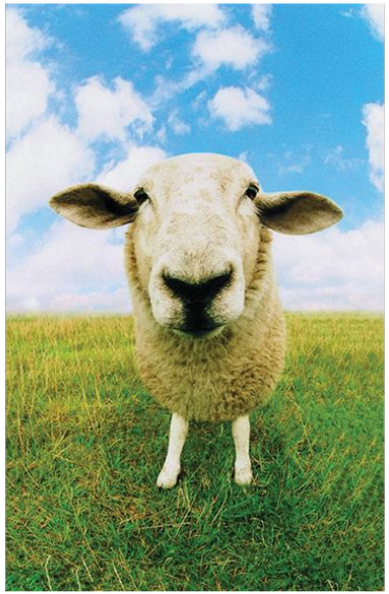
Autoencoder

11/16/2022

Outline

- Encoder
- Decoder
- Vanilla Autoencoder
- Variational Autoencoder
- Masked Autoencoder

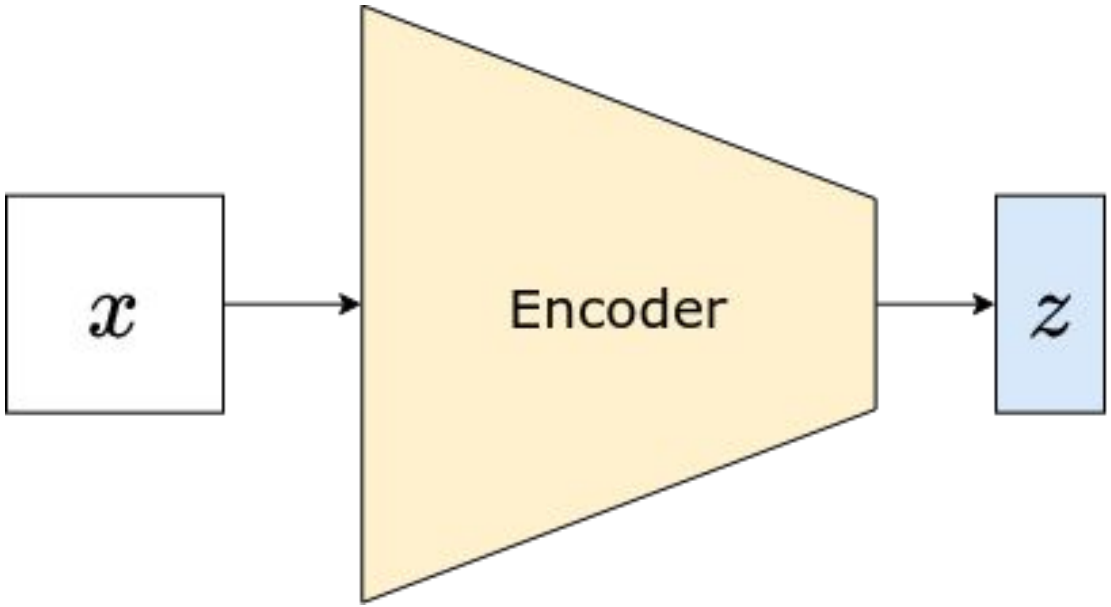
Need for Reduced Dimension



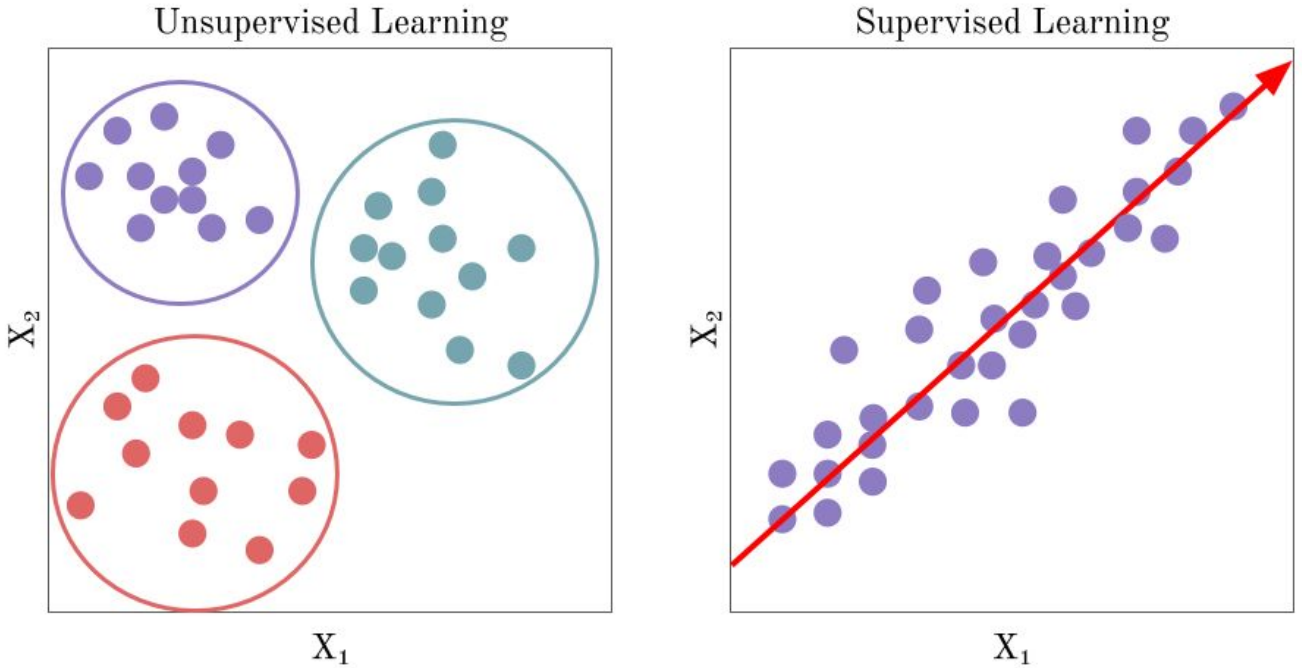
High Resolution

Low Resolution

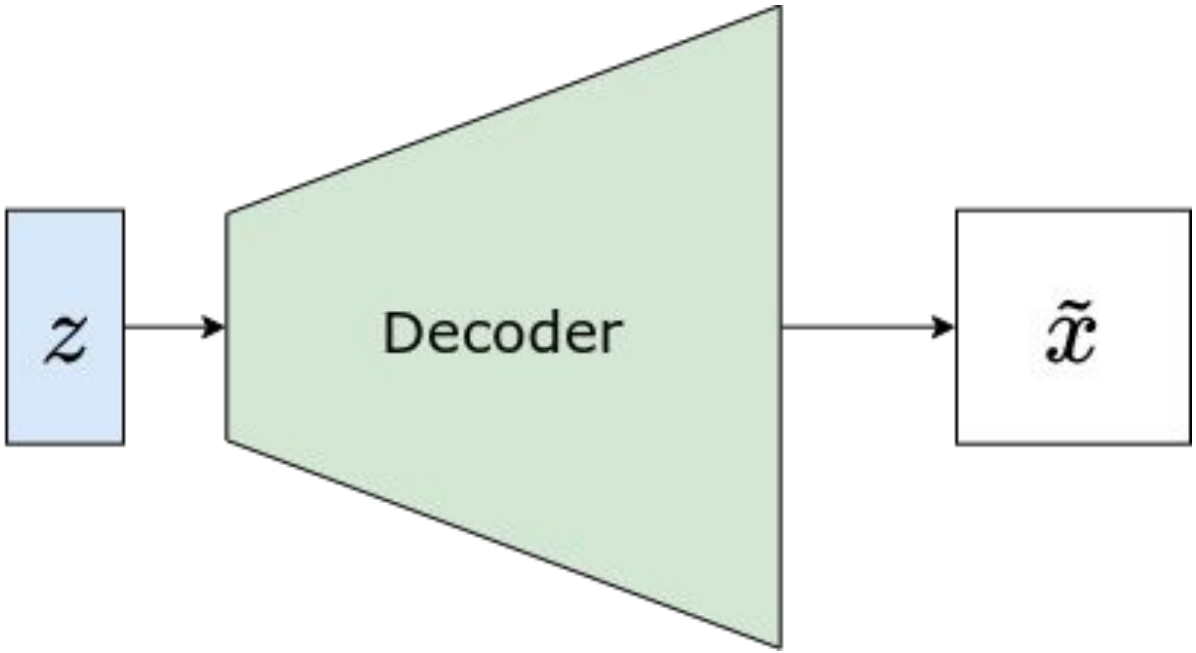
Encoder



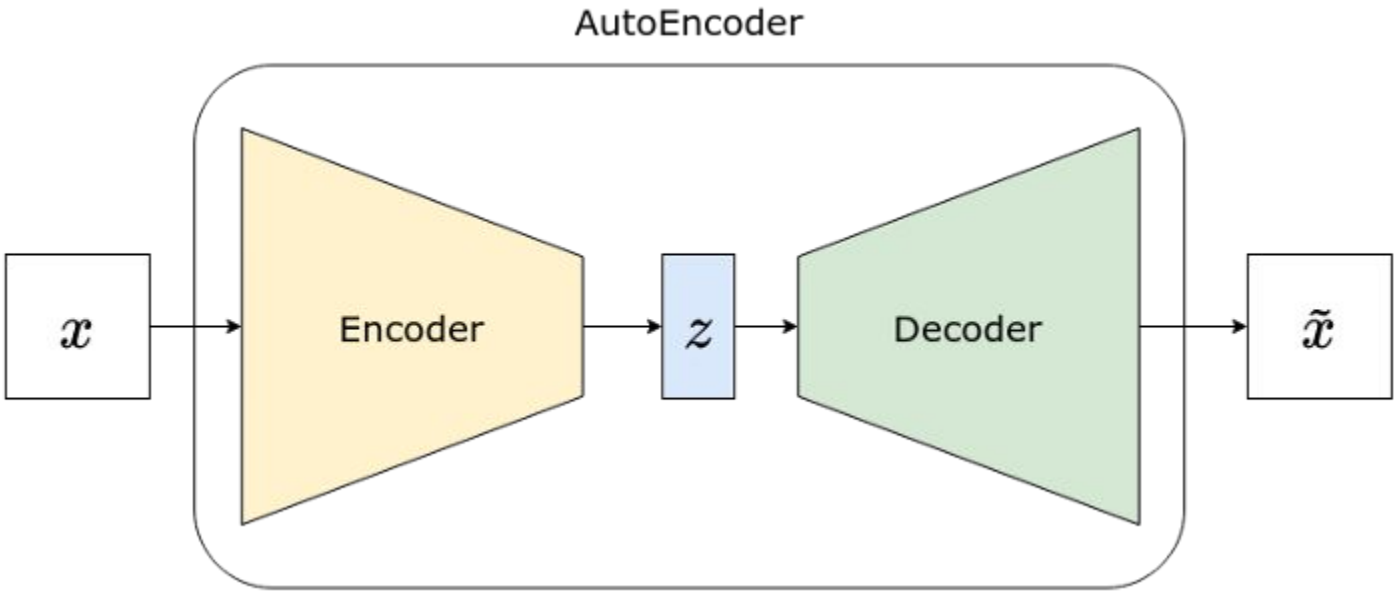
Need for Unsupervised Learning



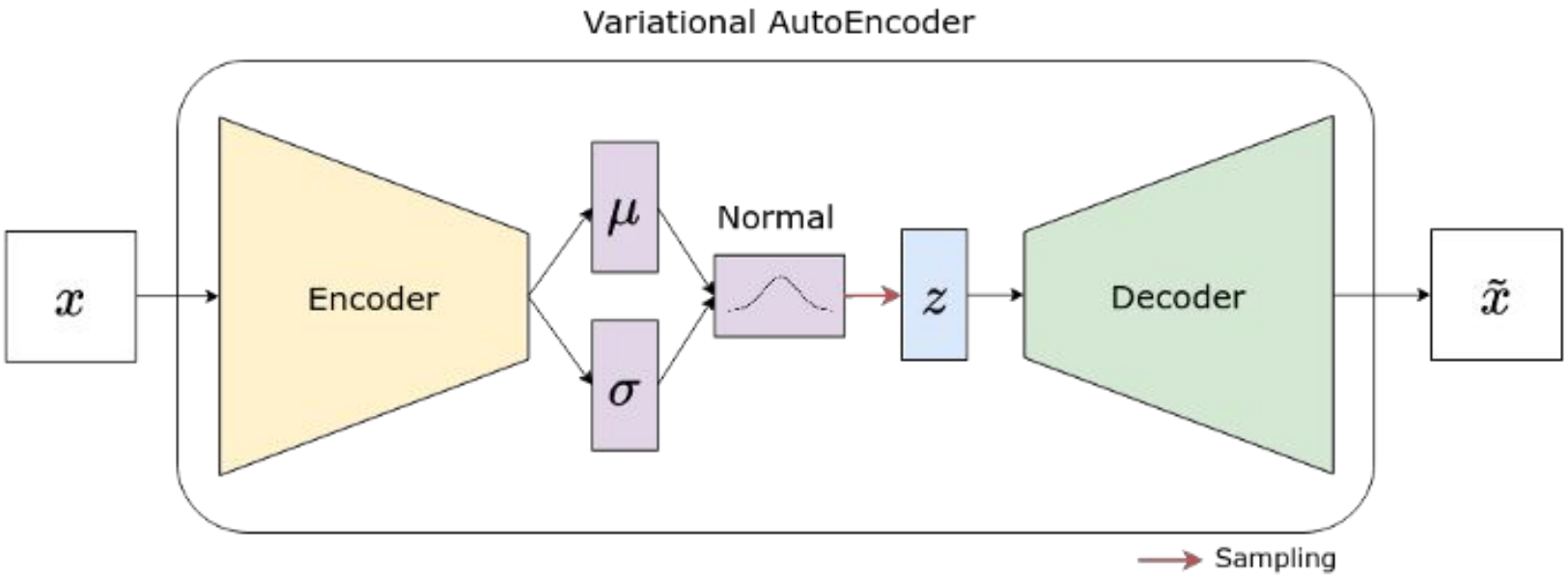
Decoder



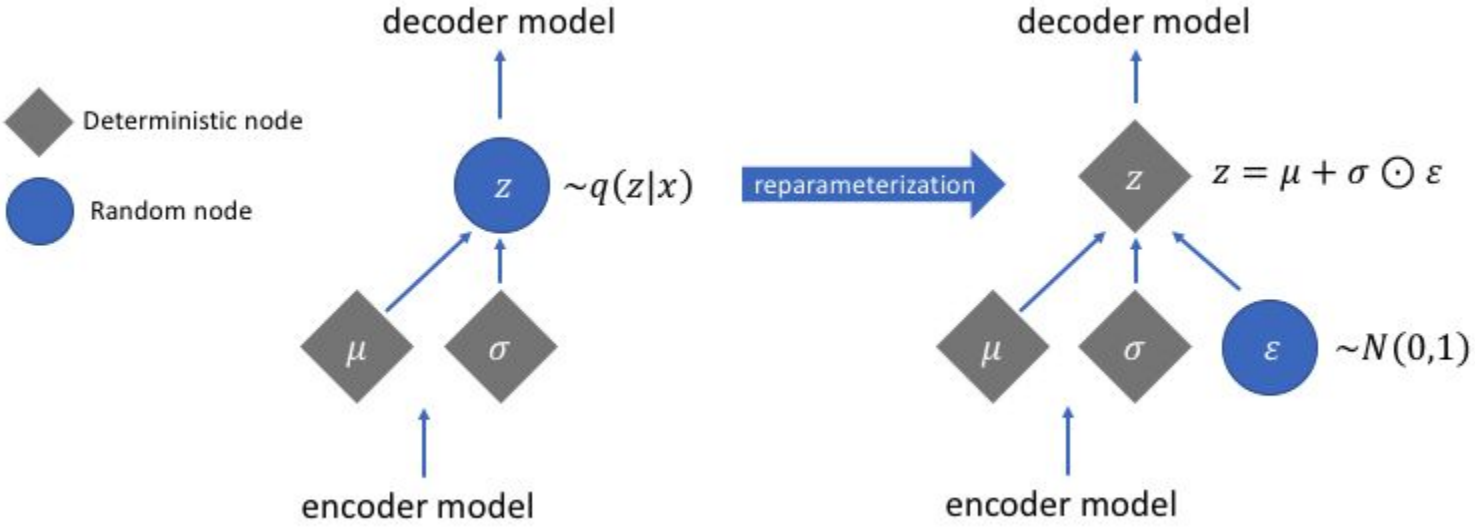
Vanilla Autoencoder



Variational Autoencoder



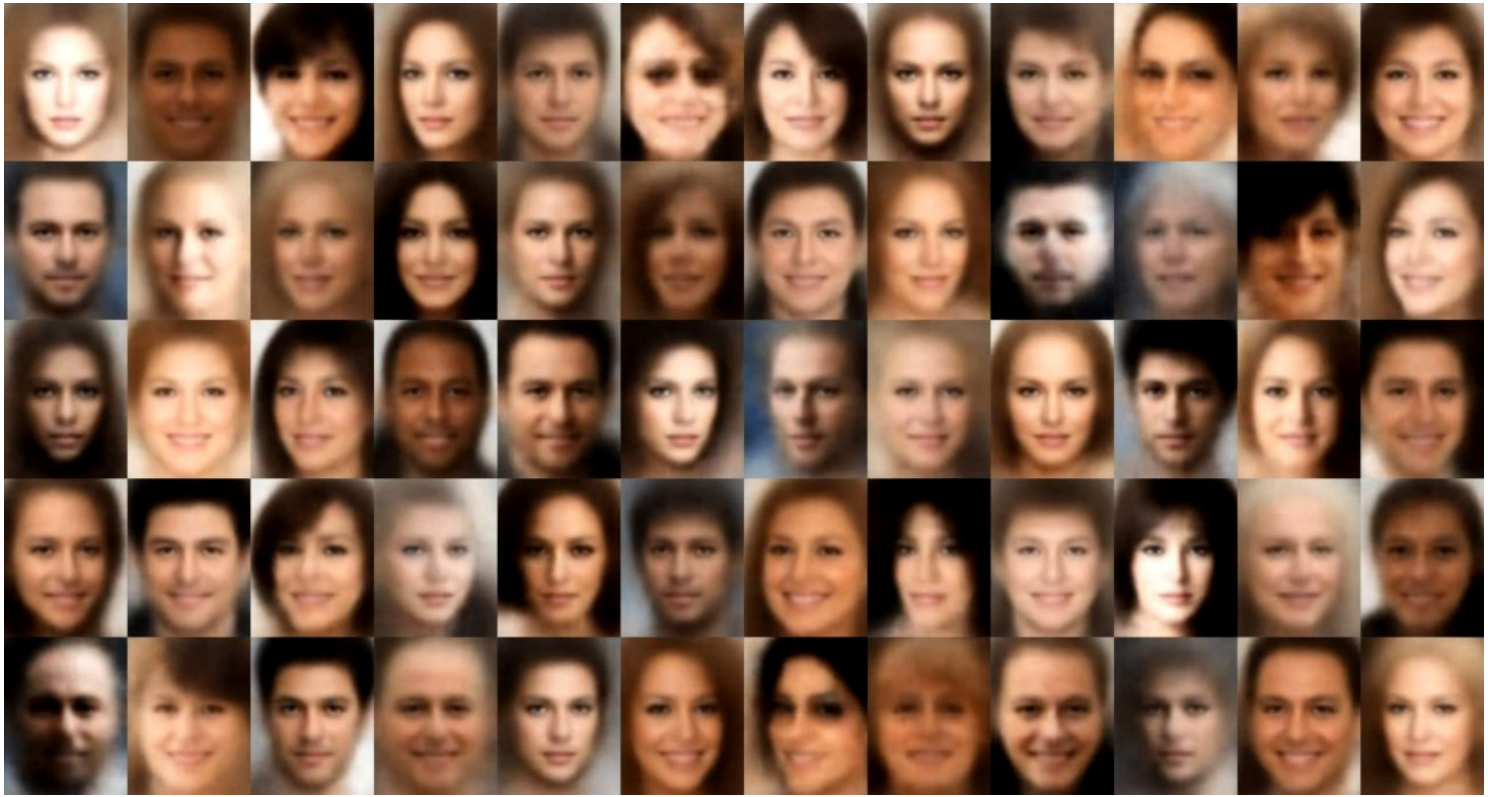
Reparameterization Trick



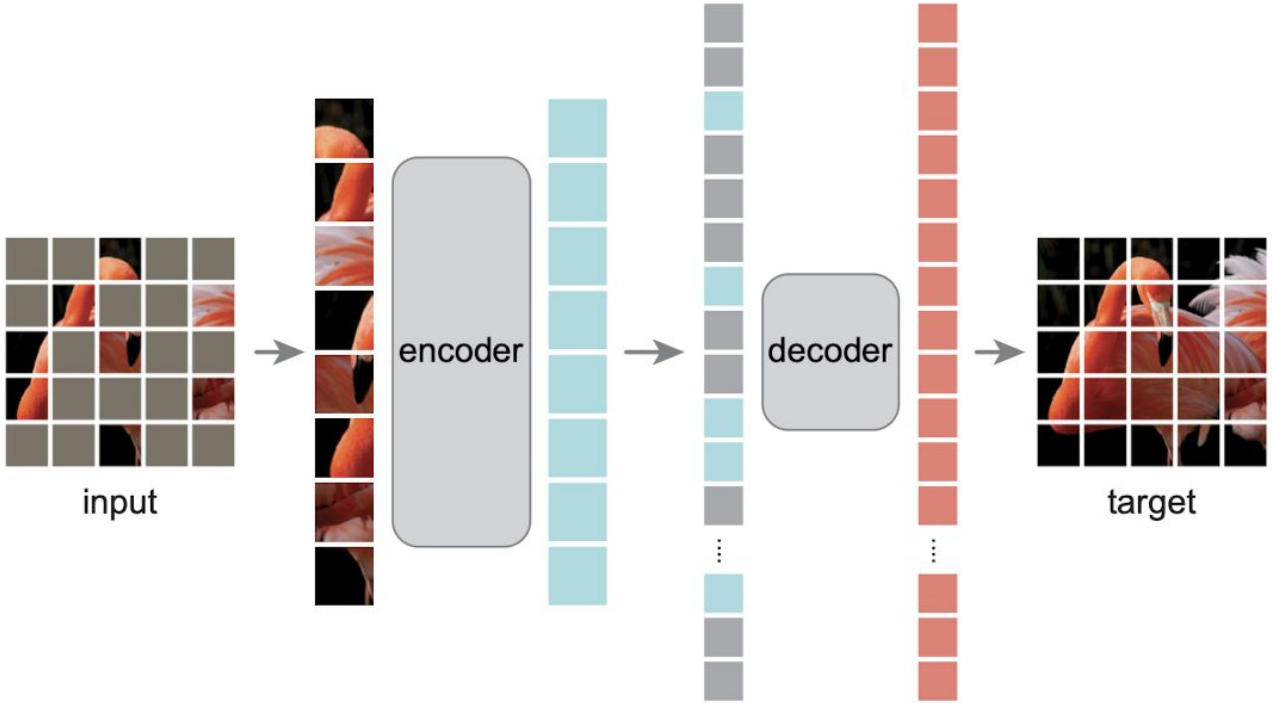
VAE Loss Function

$$-\underbrace{\mathbb{E}_{\mathbf{z}\sim q(\mathbf{z}|\mathbf{x})}\left[\log p(\mathbf{x}|\mathbf{z})\right]}_{\text{reconstruction error}}+\underbrace{\mathrm{KL}\left(q_\phi(\mathbf{z}|\mathbf{x})||p(\mathbf{z})\right)}_{\text{regularization}}$$

VAE Examples



Masked Autoencoder



Masked Autoencoder