



Siddhant Mishra-Sharma (MIT/AI FI) Summer School

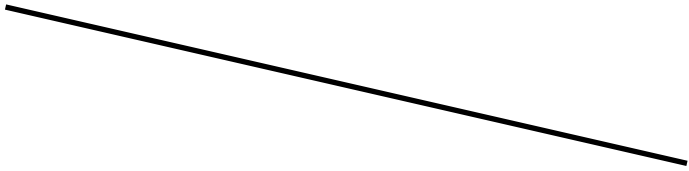


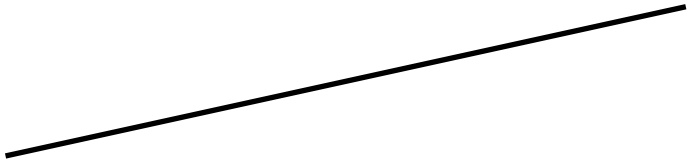
162

2

4

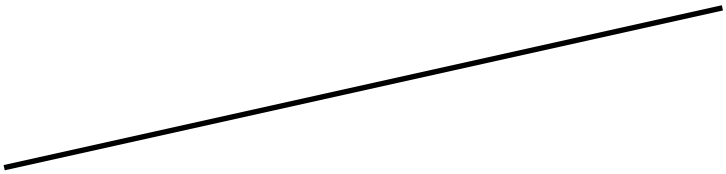
VAEs in practice

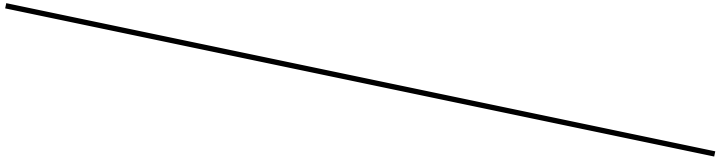
















$$x \sim p(x)$$

$$x' \sim p_q(x|z)$$

$$z \sim q_{\phi}(z|x)$$



# Decoder

*Noise model / data likelihood*

# Encoder

$$q_{\varphi}(z \mid x) = \mathcal{N}(z; \mu, \sigma^2 \mathbb{I})$$

$$\mu, \sigma^2 = \text{NN}_{\varphi}(x)$$

$$p(\mathbf{z}) = \mathcal{N}(\mathbf{z}; \mathbf{0}, \mathbf{I})$$

Prior

2



Original image

*Reconstruction*

# VAEs in practice

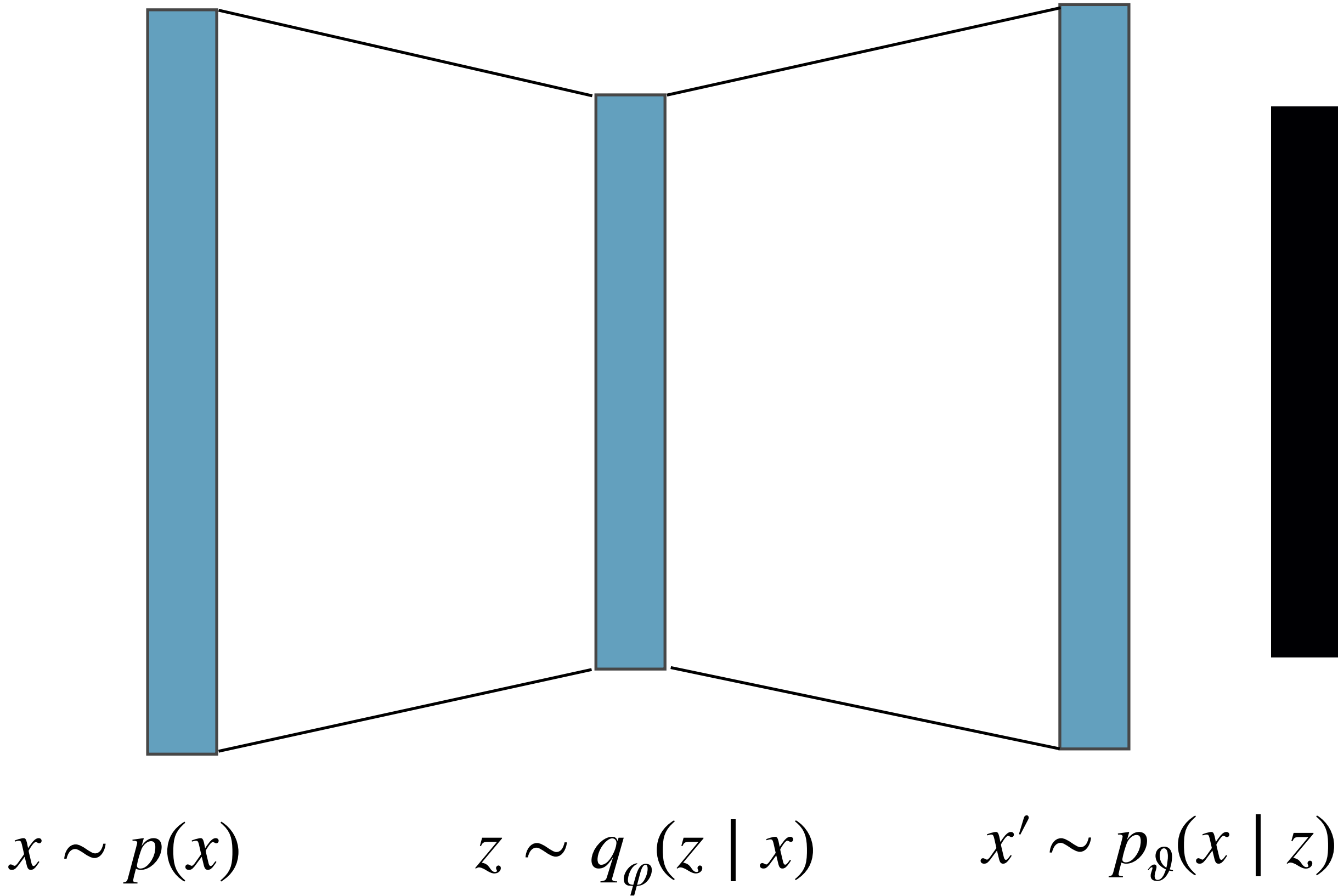
$$p(z) = \mathcal{N}(z; 0, I)$$

Prior

Original image



Reconstruction



Encoder

Decoder

$$q_\phi(z | x) = \mathcal{N}(z; \mu, \sigma^2 \mathbb{I})$$

Noise model / data likelihood

$$\mu, \sigma^2 = \text{NN}_\phi(x)$$



# VAEs in practice

$$\text{ELBO} = \langle \log p_{\theta}(x | z) \rangle_{q_{\phi}} - D_{\text{KL}} \left( q_{\phi}(z | x) \parallel p(z) \right)$$

