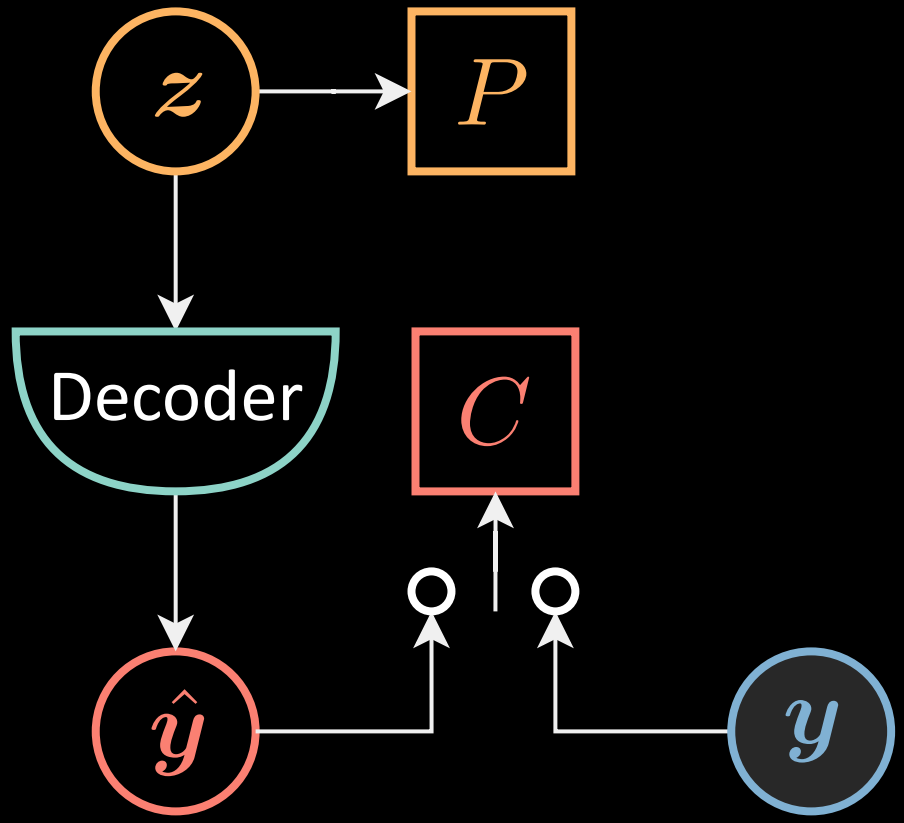
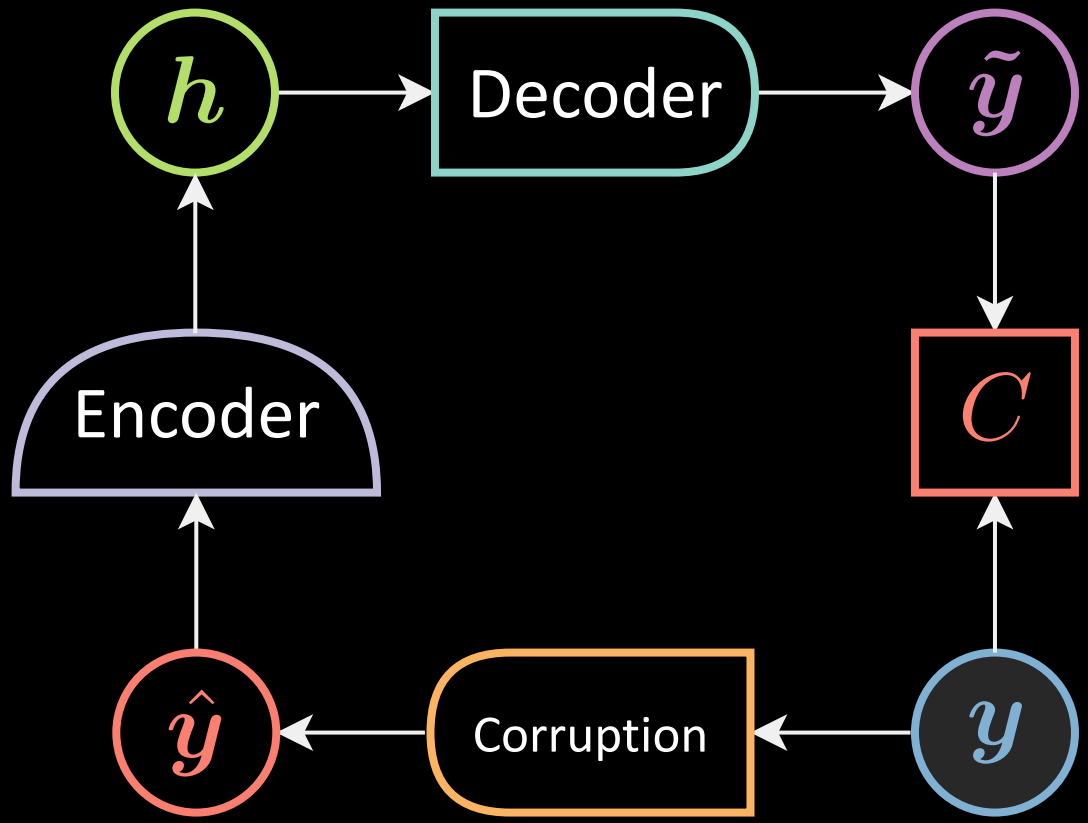
Generative adversarial nets

Unsupervised learning / Generative models

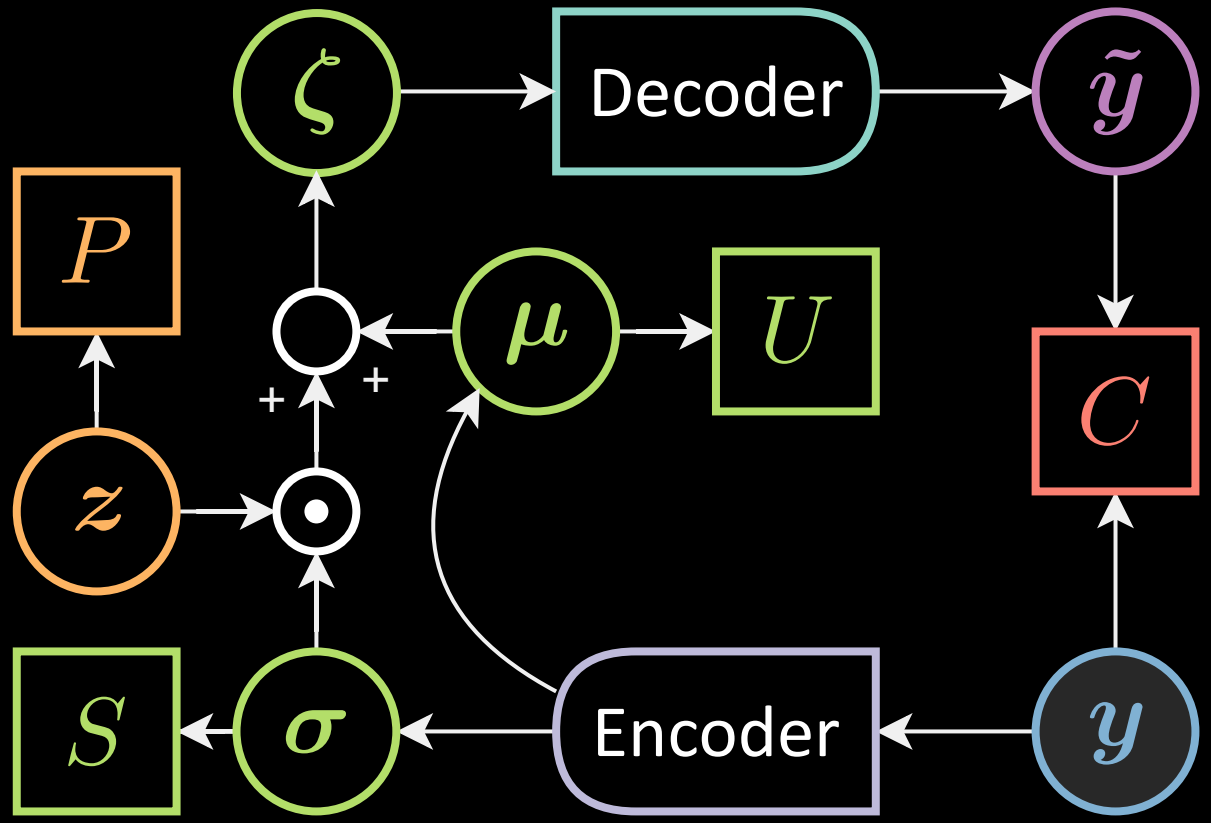
Gen$\underline{\text{ve}}$ Adversarial Net Denoising autoencoder





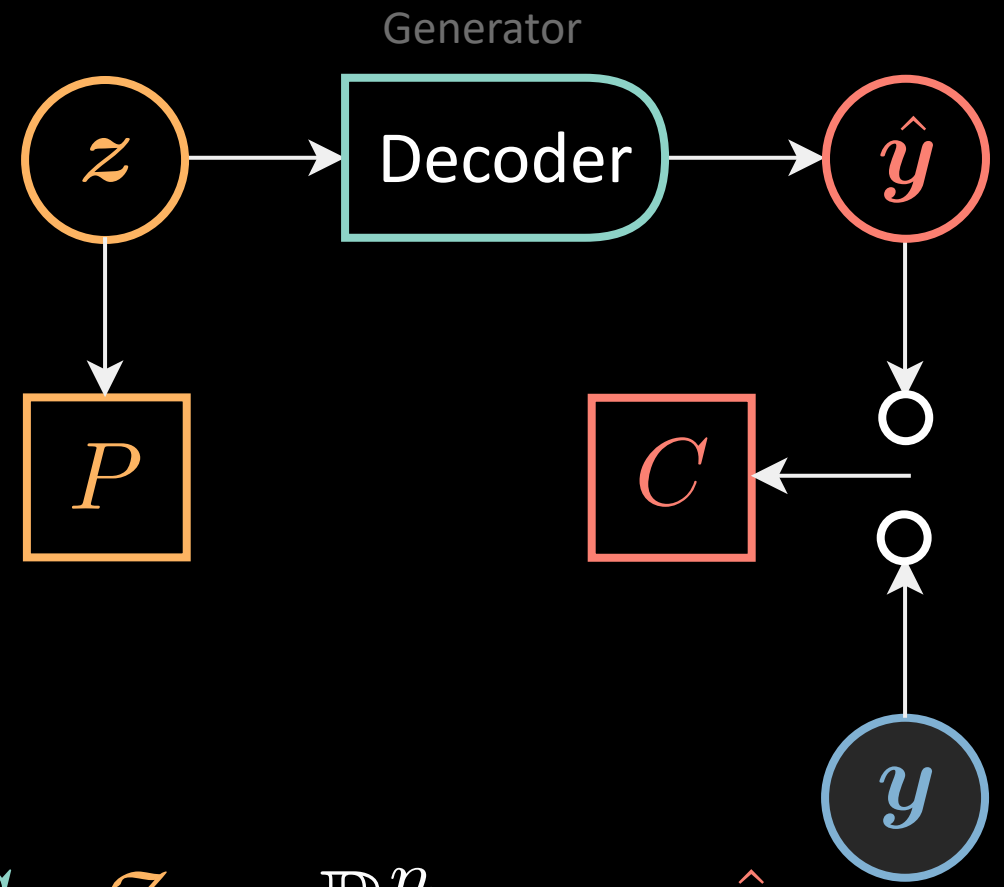
$$P(z) = \frac{1}{2}\|z\|^2$$

Variational AE



$$P(z) = \tfrac{1}{2}\|z\|^2$$

Gen$^{\underline{ve}}$ Adversarial Net



$$G : \mathcal{Z} \to \mathbb{R}^n,\ z \mapsto \hat{y}$$

$$C : \mathbb{R}^n \to \mathbb{R},\ y \vee \hat{y} \mapsto c$$

Training

$$L(\boldsymbol{w}_C, \boldsymbol{y}, \hat{\boldsymbol{y}}) = C(\boldsymbol{y}) + \left[m - C(\hat{\boldsymbol{y}})\right]^+$$

$$L(\boldsymbol{w}_G, \boldsymbol{z}) = C\left[G(\boldsymbol{z})\right]$$

$G(\boldsymbol{z})$

Possible choice of $C(\boldsymbol{y})$:

$$C(\boldsymbol{y}) = \left\| \mathrm{Dec}\left(\mathrm{Enc}(\boldsymbol{y})\right) - \boldsymbol{y} \right\|^2$$

Zhao, Mathieu, LeCun (2016) Energy-based generative adversarial network

Generative adversarial principle