
GAN

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Abstract

GAN Series

1 GAN

$$\min_G \max_D V(D, G) = \mathbb{E}_{x \sim P_{data}} [\log D(x)] + \mathbb{E}_{z \sim noise} [\log(1 - D(G(z)))] \quad (1)$$

1.1 InfoGAN

Factorized coding $c = P_G(c|x)$

$$\min_G \max_D V(D, G) = V(D, G) - \lambda I(c; G(z, c)) \quad (2)$$

We use $Q(c|x)$ to approximate $P(c|x)$:

$$\begin{aligned} I(c; G(z, c)) &= H(c) - H(c|G(z, c)) \\ &= \mathbb{E}_{x \sim G(z, c)} [\mathbb{E}_{c' \sim P(c|x)} [\log P(c'|x)]] + H(c) \\ &= \mathbb{E}_{x \sim G(z, c)} KL(P(\cdot|x), Q(\cdot|x)) + \mathbb{E}_{c' \sim P(c|x)} [\log Q(c'|x)] + H(c) \\ &\geq \mathbb{E}_{c' \sim P(c|x)} [\log Q(c'|x)] + H(c) \end{aligned}$$

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