GAN Notes

Saturday, July 30, 2022 9:17 AM

minimize G maximize D

$$\mathbb{E}_{x\sim p_{data}}[\log D(x)] + \mathbb{E}_{z\sim p(z)}[\log(1-D(G(z)))]$$

where $z \sim p(z)$ are random noise vectors

1. update generator to minimize prob. of discriminator the correct choice
2. update discriminator to maximize probability of discriminator making correct choice

IN PRACTICE, this doesn't work very well. Instead

- update generator to maximize prob. of discriminator making incorrect choice
- update discriminator to maximize probability of making correct choice

$$\underset{G}{\text{maximize}}\ \mathbb{E}_{z\sim p(z)}[\log D(G(z))]$$

$$\underset{D}{\text{maximize}}\ \mathbb{E}_{x\sim p_{data}}[\log D(x)] + \mathbb{E}_{z\sim p(z)}[\log(1-D(G(z)))]$$

BCE loss (binary cross entropy)

$$bce(s,y) = -y * \log(s) - (1-y) * \log(1-s)$$

- needed to compute log probability of true label given logits output from discriminator

$$\ell_G = -\mathbb{E}_{z\sim p(z)}[\log D(G(z))]$$

$$\ell_D = -\mathbb{E}_{x\sim p_{data}}[\log D(x)] - \mathbb{E}_{z\sim p(z)}[\log(1-D(G(z)))]$$

Inline Question 4

$$f(x,y) = xy$$

$$\nabla f(x,y) = \begin{bmatrix} y \\ x \end{bmatrix}$$

y	1	2	1	
x	1	-1		