

GANs + VAEs

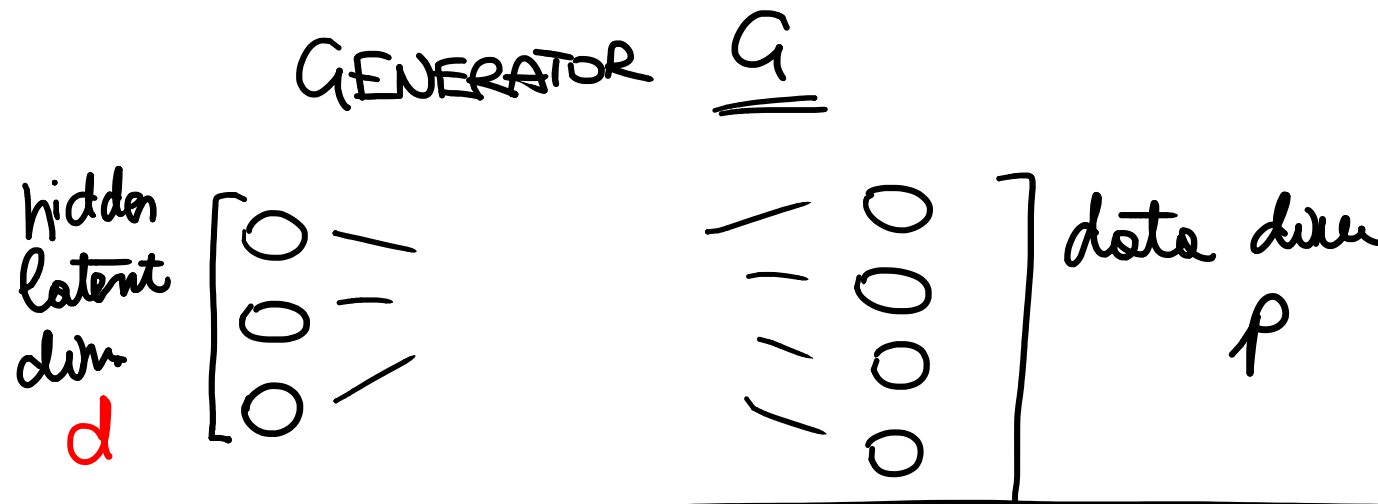
papers with code.com/rc 2020

GENERATIVE ADVERSARIAL NETWORK

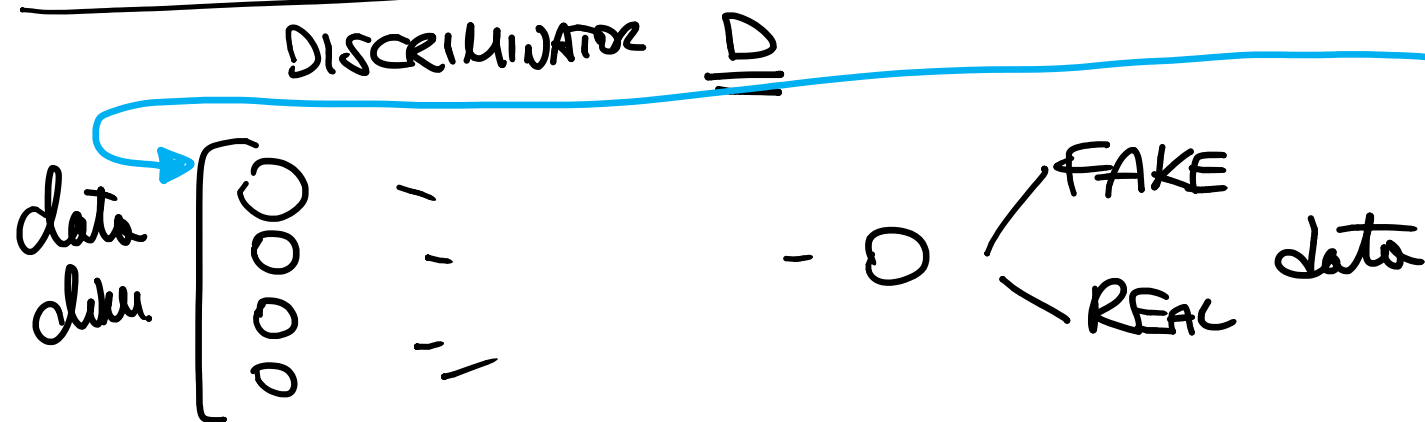
Generative model

data, ~~labels~~

data
FAKE
SYNTHETIC



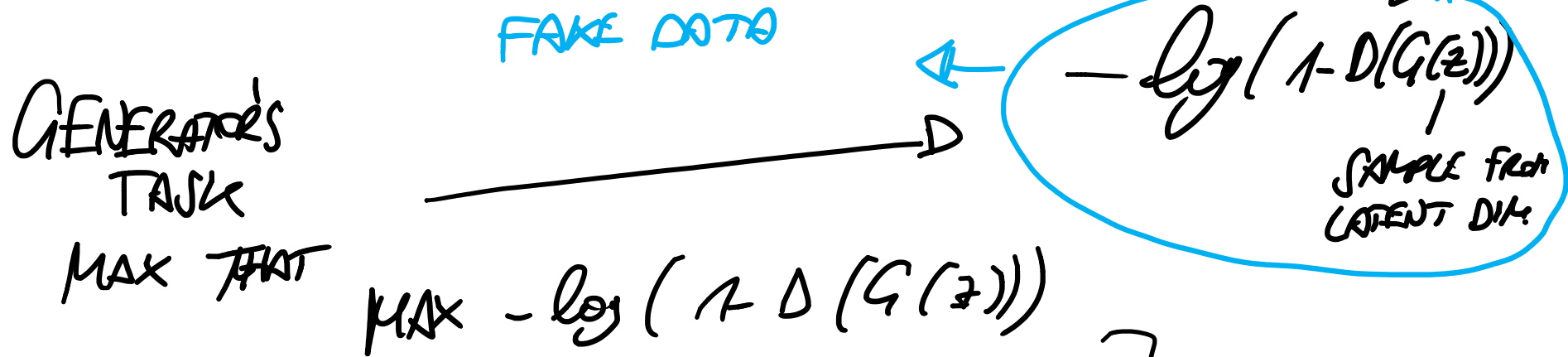
produce data



REAL DATA

$$L_D(\hat{y}, y) = -y (\log \hat{y}) - (1-y) (\log(1-\hat{y}))$$

$y=0$ FAKE $-\log(1-\hat{y}) = -\log(1-D(x))$
 $y=1$ REAL $-\log \hat{y} = -\log D(x)$



$$\left[\max_G \min_D -y (\log(D(x))) - (1-y) (\log(1-D(G(z)))) \right]$$

GEN. MINIMIZES $-\log(D(G(z)))$

$$\text{MIN } -\log(D(G(z)))$$

$$-y(\log \hat{y}) - (1-y)(1-\log \hat{y})^*$$

$y = 1 \rightarrow$ FAKE DATA

~~$y = 0 \rightarrow$ REAL DATA~~

1) INSTABILITY IN TRAINING \rightarrow 2 ANNS "EQUILIBRIUM PT."

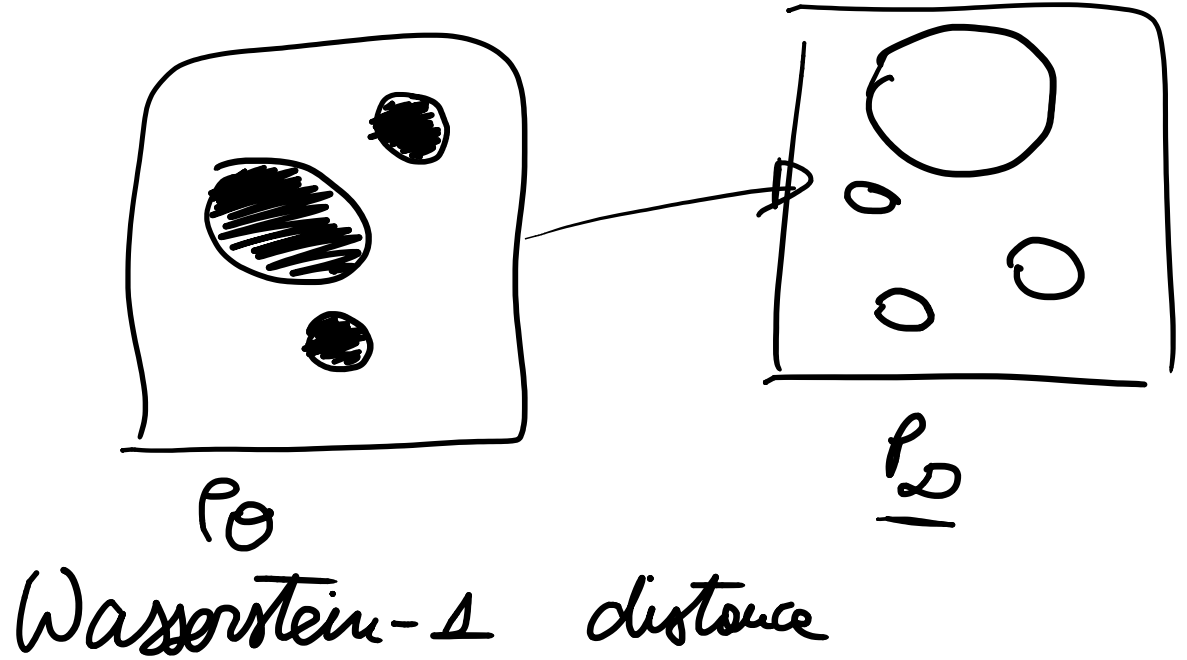
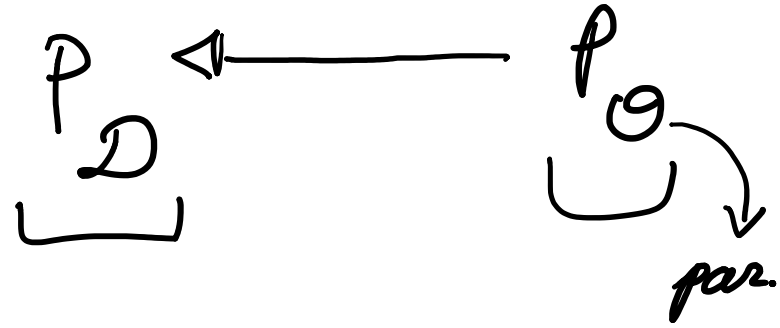
2) Mode Collapse \rightarrow OUTPUT OF GEN IS ALWAYS THE SAME

Wasserstein GAN

D (Critic)

G

\mathbb{E}_{p_D}
 \rightarrow \mathbb{E}_{p_G}
 MD Dist.



$$\mathcal{L}_C = -\frac{1}{B} \sum_{i=1}^B C_w(\pi_i) + \frac{1}{B} \sum_{i=1}^B C_w(G_\theta(z_i))$$

$$\mathcal{L}_G = -\frac{1}{B} \sum_{i=1}^B C_w(G_\theta(z_i))$$

~~REAL LABEL~~
~~FRAKE LABEL~~ y

After having updated w we clip them $w \in [-0.01, 0.01]$

2) TRAIN C MANY TIMES (B) BEFORE UPDATING θ (G)
NO Mode collapse