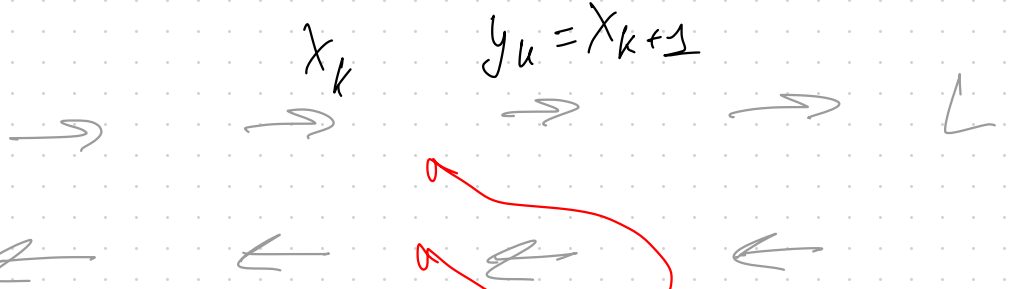
Семинар 8

2024 курс: Генеративные модели

Семинарист: Кондратенко Владимир

$$L = \mathbb{E}_{\tilde{x} \sim p_g} D(\tilde{x}) - \mathbb{E}_{x \sim p_r} D(x)$$

$$+ \lambda \mathbb{E}_{\hat{x} \sim p_{\hat{x}}} \left(\| \nabla_{\hat{x}} D(\hat{x}) \|_2 - 1 \right)^2$$



$$\frac{\partial L}{\partial w_k} = \frac{\partial L}{\partial x_{k+1}} \frac{\partial x_{k+1}}{\partial w_k} = \frac{\partial L}{\partial x_{k+1}} \frac{\partial y_k}{\partial w_k}$$

$$\frac{\partial L}{\partial x_{k+1}} \rightarrow \frac{\partial L}{\partial x_k}$$

$$\frac{\partial y_k}{\partial x_k} = \frac{\partial L}{\partial x_k}$$

$$\frac{\partial L}{\partial w_k}.$$

$$\frac{\partial D}{\partial x} = \frac{\partial D}{\partial y_1} \cdot \frac{\partial y_1}{\partial x} \rightsquigarrow \frac{\partial D}{\partial w_1} = \frac{\partial D}{\partial y_1} \cdot \frac{\partial y_1}{\partial w_1}$$

$+1$ Forward
$+1$ Backward

$$\nabla_w \left(\| \nabla_x D(x) \|_2 - 1 \right)^2$$

↘ ? $O(w \cdot x)$

$$\| \nabla_x D(x) \|_2 = F(x, w)$$

$$\frac{\partial}{\partial w} \frac{\partial D}{\partial x}$$

$\nabla_w F$ ↖
$+1$ Backward

Loss.backward()

$$\text{Loss} = \underbrace{\text{Real} + \text{Fake}}_{\text{WGAN}} + \underbrace{GP} \longrightarrow \nabla_x D(x)$$

$$\downarrow$$

$$\frac{\partial D}{\partial y_1} \cdot \frac{\partial y_1}{\partial x}$$

...

loss.backward() $\longrightarrow \nabla_w$

$$\frac{\partial D}{\partial w_1} = \frac{\partial D}{\partial y_1} \cdot \frac{\partial y_1}{\partial w_1}$$