X_t
t
T
$p(X_1, X_2, ..., X_T) = p(X_1)p(X_2|X_1)p(X_3|X_2, X_1)...p(X_T|X_1, ..., X_{T-1}).$
(1)
$p(X_t|X_1, ..., X_{t-1})$
P
Q
P
$\sum_x p(x) \log \frac{p(x)}{q(x)}$
??
?
θ

$L_{MLE} = -_{x \sim P_{data}(x)}[\log p_\theta(x)] = -_{x \sim p_{data}(x)}[\log p_\theta(x_1) + \sum_{t=2}^{T} + \log p_\theta(x_t|x_1, ..., x_{t-1})].$
(2)
?
?
?
??
?
?
??
?
$V_{GAN}(G, D) =_{x \sim p_{data}(x)} [\log D(x)] +_{z \sim p(z)} [\log(1 - D(G(z)))]$
(3)
$p(z)$
z
$G(z)$
x
$D(x)$
G
D
$q_G(x)$
$G(z)$
$p(z)$
??
D
$^*_G(x) =$
$\frac{p_{data}(x)}{p_{data}(x) + q_G(x)}$
$V(D^*_G, G)$
$p_{data}(x)$
$q_G(x)$
?
S
A
$T(s, a)$
$R(s, a)$

$T : S \times A \to SR : S \times A \to R$
(4)
$\nabla_G L_{GAN}(G, D) = \nabla_{G x \sim G(x)}[\log D(x)] =_{x \sim G(x)} [\log D(x) \nabla_G \log G(x)].$
(5)
?
??
??
?
?
$p_\theta(z|x)$
$p_\theta(x|z)$
?
??
$\log p_\theta(x)$
$\log p_\theta(z|x)$
$q_\phi(z|x)$
$L_{VAE} =_{x \sim p_{data}(x)} [KL(q_\phi(z|x)||N(\mathbf{0}, \mathbf{I})) -_{z \sim q_\phi(z|x)} [\log p_\theta(x|z)]]$
(6)
$q_\phi(z|x)$
$p_\theta(x|z)$
$p_\theta(x|z)$
$KL(q_\phi(z|x)||N(\mathbf{0}, \mathbf{I}))$
??
?
?
?
$L_{VAE} =_{x \sim p_{data}(x)} [\lambda_{KL} KL(q(z|x)||N(\mathbf{0}, \mathbf{I})) -_{z \sim q(z|x)} [\log p(x|z)]]$
(7)
λ_{KL}
$\lambda_{KL} =$
0

??
$\log T$
T
Z
$q(z|x) \leftrightarrow$