

① Generative data model

$$D = \tilde{D} + N \\ = f_{\theta}(Z) + t(\xi_N)$$

② Bayesian derivation of the true posterior distribution

$$P(Z, \theta, \xi_N | D)$$

③ Variational inference:
approximate $P(Z, \theta, \xi_N | D)$ with
 $Q(Z, \theta, \xi_N | D) = Q(Z | D) Q(\theta | D) Q(\xi_N | D)$

$$Q(z_i | d_i) = \mathcal{G}(z_i - \mu_i, \tilde{\Sigma}_i)$$

$$z_i = \mu_i + \sqrt{\tilde{\Sigma}_i} \cdot \varepsilon$$

$\mu_i, \log \tilde{\Sigma}_i = e_{\varphi}(d_i)$
Approximate
inference
function with
neural network

Connect encoder
and decoder by
inverse transform
sampling and
 $P(\varepsilon) = \mathcal{G}(\varepsilon, \mathbb{I})$

Approximate
generative
function f_{θ}
with neural
network

