
Deep Learning 2018 - Assignment 3 Deep Generative Models

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Variational Auto Encoders

Specifying the encoder $q_\phi(z_n|x_n)$

Question 1.10

$$\begin{aligned}\mathcal{L} &= \sum_{n=1}^N \mathcal{L}_n^{recon} + \mathcal{L}_n^{reg} \\ &= \log q_\phi(z_n|x_n) + \\ &= \sum_{n=1}^N -\mathcal{N}(z_n|\mu_\phi(x_n), \text{diag}(\Sigma_\phi(x_n))) + \frac{1}{2} \sum_{j=1}^J (1 + \log((\sigma_j^{(n)})^2) - (\mu_j^{(n)})^2 - (\sigma_j^{(n)})^2) \\ &= - \sum_{n=1}^N x_n \log z_n + (1 - x_n) \cdot \log(1 - z_n) + \frac{1}{2} \sum_{j=1}^J (1 + \log((\sigma_j^{(n)})^2) - (\mu_j^{(n)})^2 - (\sigma_j^{(n)})^2)\end{aligned}\tag{1}$$