

Gradients

$$\begin{aligned}\nabla_w f(w, \phi) &= \sum_i \int q(t_i \mid x_i, \phi) \nabla_w \log p(x_i \mid t_i, w) dt_i \\ &= \sum_i \mathbb{E}_{q(t_i \mid x_i, \phi)} \nabla_w \log p(x_i \mid t_i, w)\end{aligned}$$