Gradients

$$\nabla_\phi f(w,\phi) = \sum_i \int \nabla_\phi q(t_i \mid x_i,\phi) \log p(x_i \mid t_i, w) dt_i$$

$$= \sum_i \int \frac{q(t_i \mid x_i,\phi)}{q(t_i \mid x_i,\phi)} \nabla_\phi q(t_i \mid x_i,\phi) \log p(x_i \mid t_i, w) dt_i$$

$$= \sum_i \int q(t_i \mid x_i,\phi) \nabla_\phi \log q(t_i \mid x_i,\phi) \log p(x_i \mid t_i, w) dt_i$$

$$= \sum_i \mathbb{E}_{q(t_i \mid x_i,\phi)} \nabla_\phi \log q(t_i \mid x_i,\phi) \log p(x_i \mid t_i, w) dt_i$$

Log-derivative trick

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