line search

$$\gamma' = \min_{\gamma \in [0,1]} KL\left(\underbrace{q^t + \gamma(s - q^t)}_{q^t_\gamma} \,\|\, p\right)$$

$$s := \operatorname{argmin} KL\left(s \,\|\, \nabla \frac{p}{q_t} z\right)$$

RELBO — FLR —

grad.

$$\nabla_\gamma = -\int_z q^t_\gamma \log\left(\frac{q^t_\gamma}{p}\right) dz$$

$$= -\int \nabla_\gamma q^t_\gamma \log\left(\frac{q^t_\gamma}{p}\right) + q^t_\gamma \cdot \nabla_\gamma \log\left(\frac{q^t_\gamma}{p}\right)$$

$\nabla_\gamma q^t_\gamma = (s - q^t)$

$\frac{1}{q^t_\gamma} \cdot \nabla_\gamma q^t_\gamma$

$$= -\int \nabla_\gamma q^t_\gamma \left(1 + \log q^t_\gamma - \log p\right)$$

$$= -\int (s - q^t)\left(1 + \log q^t_\gamma - \log p\right)$$

$$= -\mathbb{E}_s\left[1 + \log q^t_\gamma - \log p\right] \quad \text{(res-s)}$$

code: q_t ← sample-s

$$+ \mathbb{E}_{q^t}\left[1 + \log q^t_\gamma - \log p\right] \quad \text{(res-q)}$$

← sample-q

$$= \begin{cases} \mu^{t+1} \in [\mu^t, w_s] \\ \sigma^{t+1} \in [\sigma^t, \delta_s] \end{cases}$$

pbar

new mix: $(1-\gamma) q_t + \gamma s$

$\gamma < \frac{2}{k+2}$

$w = [(1-\gamma)w, \gamma]$

q_{next}

$$\hat{\nabla}_\gamma \approx \frac{1}{\text{mass}} \frac{1}{N} \left[\text{res-q} - \text{res-s}\right]$$

once α_t will always report $\neq 0$!!

$$\gamma_{new} = \gamma_{old} + \alpha_t \cdot \left(\hat{\nabla}_\gamma\right)^{n}_{t+1}$$

project onto $[0,1]$