Controlled MCMC

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Algorithm 2 Revised

1. **input**:
   (a) θ_0 = starting value, $\in \mathbb{R}^{d\times 1}$
   (b) $\mu_{t=(0,\ldots,T_1)} = \theta_0$
   (c) $\Sigma_{t=(0,\ldots,T_1)} = \text{diag}\ (0.01\theta_0^1, 0.01\theta_0^2, \ldots, 0.01\theta_0^d)$
   (d) $\beta = 1$ is the scale
   (e) Set $T_1 = 199$.
   (f) $\phi_0 = 0$
2. **for** $t = 1, \ldots, T_1$
   (a) $\theta^*|\theta_{t-1} \sim \mathcal{N}\left(\theta_{t-1}, e^{\beta}\Sigma_t\right)$
   (b) $\alpha_t = \min\left(1, \frac{p(\theta^*|y)}{p(\theta_{t-1}|y)}\right)$, Symmetric proposal: Evaluate this and the accept reject step in logarithm, also reject if $\log p(\theta^*|y) = \infty$.
   (c) **If** accepted: set $\theta_t = \theta^*$, $\phi_t = 1$ **Else** $\theta_t = \theta_{t-1}$, $\phi_t = \phi_{t-1}$
3. **for** $t = T_1 + 1, \ldots T$
   (a) $\delta = (t - T_1)^{-0.6}$
   (b) $\beta = \delta_t(\phi_{t-1} - 0.234)$
   (c) $\Delta_t = \theta_{t-1} - \mu_{t-1}$, $\Delta_t \in \mathbb{R}^{d\times 1}$
   (d) $\mu_t = (1 - \delta)\mu_{t-1} + \delta\Delta_t$
   (e) $\Sigma_t = (1 - \delta)\Sigma_{t-1} + \delta(\Delta_t\Delta_t^T)$
   (f) $\theta^*|\theta_{t-1} \sim \mathcal{N}\left(\theta_{t-1}, e^{\beta}\Sigma_t\right)$
   (g) $\alpha_t = \min\left(1, \frac{p(\theta^*|y)}{p(\theta_{t-1}|y)}\right)$, Symmetric proposal: Evaluate this and the accept reject step in logarithm, also reject if $\log p(\theta^*|y) = \infty$.
   (h) **If** accepted: set $\theta_t = \theta^*$, $\phi_t = 1$ **Else** $\theta_t = \theta_{t-1}$, $\phi_t = \phi_{t-1}$