WEEK 4 SUMMARY

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$$T(\xi,\tau,\alpha,M)=\sum_{i=1}^{M}\frac{1}{(\lambda_i+\tau^2)^{\alpha/2}}\xi_i q_i=u \tag{1}$$

$$g(\xi,\tau,\alpha,M)\propto\exp\left(-\Phi(T(\xi,\tau,\alpha,M))-\frac{1}{2}\langle\xi,\xi\rangle+\log(\pi_0(\tau,\alpha,M))\right) \tag{2}$$

Algorithm 1 Non-centered parameterization, hierarchical with τ,α,M

Choose $\xi^{(0)}\in\mathbb{R}^N,\tau^{(0)},\alpha^{(0)},M^{(0)}>0,\beta\in(0,1]$ and $\epsilon_1,\epsilon_2>0$.
for $k=0$ to S **do**
  Propose $\hat{\xi}^{(k)}=(1-\beta^2)^{\frac{1}{2}}\xi^{(k)}+\beta\zeta^{(k)}$, $\zeta^{(k)}\sim N(0,I)$
  Make transition $\xi^{(k)}\to\hat{\xi}^{(k)}$ with probability

$$A(\xi^{(k)}\to\hat{\xi}^{(k)})=\min\left\{1,\exp\left(\Phi(T(\xi^{(k)},\tau^{(k)},\alpha^{(k)},M^{(k)}))-\Phi(T(\hat{\xi}^{(k)},\tau^{(k)},\alpha^{(k)},M^{(k)}))\right)\right\}$$

▷ T defined in (1)

  Propose $\hat{\tau}^{(k)}=\tau^{(k)}+\epsilon_1\rho^{(k)},\rho^{(k)}\sim N(0,I)$
  Make transition $\tau^{(k)}\to\hat{\tau}^{(k)}$ with probability

$$A(\tau^{(k)}\to\hat{\tau}^{(k)})=\min\left\{1,\frac{g(\xi^{(k+1)},\hat{\tau}^{(k)},\alpha^{(k)},M^{(k)})}{g(\xi^{(k+1)},\tau^{(k)},\alpha^{(k)},M^{(k)})}\right\}$$

▷ g defined in (2)

  Propose $\hat{\alpha}^{(k)}=\alpha^{(k)}+\epsilon_2\sigma^{(k)},\sigma^{(k)}\sim N(0,I)$
  Make transition $\alpha^{(k)}\to\hat{\alpha}^{(k)}$ with probability

$$A(\alpha^{(k)}\to\hat{\alpha}^{(k)})=\min\left\{1,\frac{g(\xi^{(k+1)},\tau^{(k+1)},\hat{\alpha}^{(k)},M^{(k)})}{g(\xi^{(k+1)},\tau^{(k+1)},\alpha^{(k)},M^{(k)})}\right\}$$

  Propose $\hat{M}^{(k)}=M^{(k)}+Q$, with jump Q distributed as $\mathbb{P}(Q=k)\propto\frac{1}{1+|k|}$, $|Q|$ bounded.
  Make transition $M^{(k)}\to\hat{M}^{(k)}$ with probability

$$A(M^{(k)}\to\hat{M}^{(k)})=\min\left\{1,\frac{g(\xi^{(k+1)},\tau^{(k+1)},\alpha^{(k+1)},\hat{M}^{(k)})}{g(\xi^{(k+1)},\tau^{(k+1)},\alpha^{(k+1)},M^{(k)})}\right\}$$

end for
return $\{T(\xi^{(k)},\tau^{(k)},\alpha^{(k)}),\tau^{(k)},\alpha^k\}$
