LA MÉTHODE HESSIAN AVEC DÉPENDANCE CONDITIONNELLE.

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ABSTRACT

We consider state space models where the state vectors $\alpha = (\alpha_1, \ldots, \alpha_n)^\top$ is Gaussian and the observed vector $y = (y_1^\top, \ldots, y_n^\top)^\top$ need not be. We allow conditional dependance between the observed vector and the innovation of the state equation, so that the density (or mass) function $f(y_t|\alpha)$ depends not only on α_t but also on α_{t+1}. Many important models feature this type of dependance, including stochastic volatility models with the leverage effect. We develop a close approximation $g(\alpha|y)$ of the conditional density $f(\alpha|y)$ of the state vector given observed data. This approximation can be used as an importance distribution for importance sampling, or as a proposal distribution for Markov chain Monte Carlo (MCMC) methods. Applications include the approximation of likelihood functions, and Bayesian posterior inference. Our approximation is closely related to a similar approximation in McCausland(2008) for models where $f(y_t|\alpha)$ only depends on α_t and not α_{t+1}. We illustrate using an empirical example featuring stochastic volatility models with leverage.

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