Particle Learning Group

Hedibert F. Lopes and Carlos M. Carvalho

Week 1 Summary Report

PL in Econometrics and Finance

- General Goal: Further our understanding and pursue new alternatives to estimate the "fixed" parameters in general state-space models. Focus on the sequence $p(x_t, \theta | y^t)$ for all t.

- Specifics...
  - Explore the connections between Liu and West (2001) and Carvalho et. al (2008)
  - Extensive empirical comparisons
  - Bias and re-parameterization issues
  - Address lingering theoretical issues

- Models and Applications...
  - DSGE models in Macroeconomics. Remember, θ is the goal!
  - Pricing models in Finance.
  - High-frequency volatility models.
  - ...

Summary of Discussion: Week 1

1. Closer look at Liu and West (2001)

- Choice of δ
- Bias/reparametrization

2. Explore links between Liu and West (2001) (LW) and Carvalho *et. al* (2008) (PL)

- Empirical comparisons (MCMC and close form solution in simple models)
- Is PL a special case of LW? When do they match?
- What if some parameters admit a sufficient statistic representation but other don't? Can we develop a notion of "partial" sufficient statistics?

Summary of Discussion: Week 1

3. DSGE models: Should we work with $p(\theta|y^T)$ or build a sequence $p(x_t, \theta|y^t)$ for all t ? Remember, the goal is inference about θ.

- Focus on the example presented by David DeJong (slides available)
- There are potentially useful SMC+MCMC alternatives for this problem... Doucet's talk, PMC of Robert, approximations through mixtures of Niemi and West...

4. Long Memory via SMC

- As an example we will initially focus on stochastic volatility models
- Christian Macaro will provide some references next week

Summary of Discussion: Week 1

5. Be prepared to discuss the following papers
   - Liu and West (2001) Combined parameter and state estimation in simulation-based filtering. In *Sequential Monte Carlo Methods in Practice* (eds: A. Doucet et al), Cambridge University Press. `http://ftp.stat.duke.edu/WorkingPapers/99-14.html`. As an example we will initially focus on stochastic volatility models
   - Storvik (2002) Particle Filters for State-Space Models With the Presence of Unknown Static Parameters. *IEEE Transactions on Signal Processing*, **50(2)**, 281-289.