Bayesian data analysis – reading instructions 12

Aki Vehtari

Chapter 12

Outline of the chapter 12

- 12.1 Efficient Gibbs samplers (not part of the course)
- 12.2 Efficient Metropolis jump rules (not part of the course)
- 12.3 Further exetensions to Gibbs and Metropolis (not part of the course)
- 12.4 Hamiltonian Monte Carlo (used in Stan)
- 12.5 Hamiltonian dynamics for a simple hierarchical model (read through)
- 12.6 Stan: developing a computing environment (read through)

Matlab/Python/R Stan demos

- See rstan_demo.Rmd, pystan_demo.py, pystan_demo.ipynb, or matlabstan_demo.m for demos how to use Stan from Matlab/Python/R and several model examples

There is only 8 pages to read (sections 12.4-12.6) what is inside Stan.

- Visualization of Metropolis, HMC, and NUTS (not the specific version in Stan, but illustrative of the behavior) https://chi-feng.github.io/mcmc-demo/app.html#RandomWalkMH,donut

Further information about Stan

- http://mc-stan.org/ & http://mc-stan.org/documentation/
  - I recommend to start with these
    - Bob Carpenter, Andrew Gelman, Matt Hoffman, Daniel Lee, Ben Goodrich, Michael Betancourt, Marcus A. Brubaker, Jiqiang Guo, Peter Li, and Allen Riddell (2015) In press for Journal of Statistical Software. Stan: A Probabilistic Programming Language. http://www.stat.columbia.edu/~gelman/research/published/stan-paper-revision-feb2015.pdf
    - Andrew Gelman, Daniel Lee, and Jiqiang Guo (2015) Stan: A probabilistic programming language for Bayesian inference and optimization. In press, Journal of Educational and Behavior Science. http://www.stat.columbia.edu/~gelman/research/published/stan_jebs_2.pdf
  - Modeling Language User's Guide and Reference Manual (more complete reference with lot's of examples)
  - Stan for the beginners in 6 mins (YouTube video)
  - Efficient Bayesian inference with Hamiltonian Monte Carlo by Michael Betancourt (YouTube video)
  - The Stan modeling language by Michael Betancourt (YouTube video)