Chapter 5: An Introduction to Using Markov Chain Monte Carlo Approaches with Dynamic Models

The supplemental materials within this folder and its subfolders provide the steps associated with the example provided in the chapter and with the exercises posed, and supporting mechanisms for the chapter on using MCMC with Dynamic models. Broadly, these materials include a library bridging between R and Vensim, R code to ease the application of MCMC with Vensim models, definition of the example model in that framework, and R scripts for the specific steps undertaken in the chapter.

Contents:

- READ ME.pdf
  - This file.
- RVensimInterface
  - The bridge between R and Vensim, permitting 32-bit R to load, parameterize, run, and read values from Vensim models under Windows. This library has been verified to work with Vensim 5.1 and R.2.14 under Microsoft Windows 7 64-bit.
  - RVensimInterface8.dll
    - A dynamic link library (DLL) providing the low-level support for the bridge.
  - RVensimInterface8.c
    - The source code for the above. To be compiled using the following command from 32-bit R
      C:\Usask\Research\VensimMCMC\VensimRCompatibleDLL>"c:\Program Files\r\R-2.14.1\bin\R.exe" --arch i386 CMD SHLIB -L./ -lVenDLL32 RVensimInterface6.c
  - RVensimInterface5.R
    - The R stubs needed to interface to the C code.
- RVensimMCMCUtilities
  - Provides utility functions to ease the process of using R's MCMC libraries with dynamic models specified in Vensim. They are designed to simply multiple steps of the process, including finding the initial parameter vector, performing the chain, and summarizing and depicting results. Use of such functions can greatly reduce the amount of code required to perform MCMC in this way for a wide variety of MCMC problems, and allow for a considerably cleaner specification of such MCMC problems. Such utilities are used in the example provided
  - MCMCUtility v3.R
    - Defines the functions
- SEIRExample
  - Specifes the particular example model used in the chapter, as well as related exercises.
  - VensimSEIRModel
    - Defines the Vensim model used for both the example and exercises.
      SEIR Model v7.vpm
  - SEIRProbabilisticModel
    - Defines the probabilistic model accompanying the example. This defines the prior, sampling, and posterior distributions, and relates the empirical data to the SD model output as needed to compute the density of the latter two such distributions.
      Bounded SEIR MCMC v11.R
  - SEIR Chapter Commands v12 Finalizing
    - The commands used to actually perform the example and related exercises in the chapter.