

Modelling Daily Water Discharges with Regime Switching Models

Krisztina Vasas

Dept of Probability Theory and Statistics
Eötvös Loránd University, Hungary

e-mail: `v_krisz@cs.elte.hu`

We give a talk on fitting a two-state autoregressive regime switching model for daily water discharge series registered at monitoring sites of River Tisza in Hungary. One peculiarity of the model is that the noise sequence switches distribution according to the gamma and normal law, the rising regime being governed by the gamma distributed part. When the change points of the regimes (which are hidden variables) are driven by a Markov chain, the estimation can be carried out by a simple implementation of the MCMC algorithm. In this case we update variables via Gibbs-sampling if it is possible, and Metropolis-Hastings algorithm otherwise. However, as regime lengths in hydrological series are known to deviate from the geometric distribution, Markov-modelling is not entirely satisfactory. When generalizations of the model are considered, more sophisticated estimation algorithms should be chosen. In some particular non-Markovian cases, we can still use the combination of the Gibbs-sampler and the Metropolis-Hastings method. This occurs when the length of the ascending period has negative binomial distribution, and the descending one is geometrically distributed. Another way of generalization if we let to alter the number of change points, then the estimation needs a so-called reversible jump MCMC method.

Keywords: Regime Switching; Reversible Jump MCMC; River Discharge Modelling