



Fast Approximate Likelihood Evaluation for Stable VARFIMA Processes

Nalini Ravishanker*

University of Connecticut, Storrs CT, USA - nalini.ravishanker@uconn.edu

Jeffrey S. Pai

University of Manitoba, Winnipeg, Canada - jeffrey.pai@umanitoba.ca

For VARFIMA models with sub-Gaussian stable errors, we present fast approximate likelihood computation by using a multivariate preconditioned conjugate gradient (MPCG) algorithm, and Monte Carlo integration over unobserved variables. The MPCG approach involves solution of a block-Toeplitz system, while the Monte Carlo integration involves averaging over the distribution of the unknown process and error history, and the distribution of the variables describing the stable error process. This approach facilitates frequentist inference for long multivariate time series exhibiting long range dependence and heavy tails. We illustrate our approach using simulated data and on time series on daily average temperatures measured at several U.S. cities that are modeled by VARFIMA processes.

Key words: heavy-tails, long-range dependence, MLEs, multivariate time series