Robust Estimation of Autoregressive Parameters Via Goodness-of-Fit

Kai W. Ng[1] and Pauline P.S. Woo[1]

[1] Department of Statistics and Actuarial Science, University of Hong Kong, Pokfulam Road, Hong Kong

Abstract

The common method for estimating the autoregressive parameter in a time series is the MLE, which generally depends on the correct likelihood for good performance. In this presentation, I shall introduce an estimation approach that makes use of the independence of the innovation term in a time series, but not the parametric form of the distribution of the innovation. The approach is based on the spirit of goodness-of-fit of the model to the assumption of independent innovations. One particular estimation method, based on Wolfowitz (1943) statistic for testing randomness, will be considered in this presentation. For demonstration purpose, simulation results for an AR(1) and AR(2) models will be shown in comparison with correct and incorrect MLE for different non-Gaussian innovation distributions such as Cauchy, Student, logistic, Laplace, Gamma and lognormal.