

An entropy approach for diagnostic checking in time series analysis

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Abstract

It is a fact that a hydrological time series cannot be defined as a true model in practice. One of the important problems in stochastic hydrology is to determine the most appropriate model, and therefore modellers have certain flexibilities in exercising their subjective judgment in model identification. For this purpose, autocorrelation function [ACF], minimum residual variance [Min Var(e)], and Akaike Information Criterion [AIC- AICC-modified AIC- and FPE-final prediction error-] are widely used for testing the goodness of fit (model identification or diagnostic check) in time series modelling. The objective of this paper is to investigate diagnostic checking criteria, to compare their performance for linear autoregressive (AR) models, and to define a new entropy-based criterion (transinformation).

In the presented study, observed and synthetic data sets are modelled and recognised criteria are evaluated in order to compare the diagnostic checking. All data sets are investigated for AR(1), AR(2), AR(3), ARMA(1,1) and ARMA(1,2) models which are mostly used in hydrology. The results showed that the performance of the transinformation criterion is superior to the other investigated diagnostic checking criteria.

Keywords: time series modelling, diagnostic checking, order determination, entropy, transinformation