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Title:

A new nonparametric stationarity test of time series in time domain

Abstract:

In this talk, we present a new double order selection test for checking second-order stationarity of a time series. To develop the test, a sequence of systematic samples are defined via the Walsh functions. Then the deviations of the autocovariances based on these systematic samples from the corresponding autocovariances of the whole time series are calculated and the uniformly asymptotic joint normality of these deviations over different systematic samples is obtained. With a double order selection scheme, our test statistic is constructed by combining the deviations at different lags in the systematic samples. The null asymptotic distribution of the proposed statistic is derived and the consistency of the test is shown under fixed and local alternatives. Simulation studies demonstrate well-behaved finite sample properties of the proposed method. Favorable comparisons with the test of Dette et al. (2011) in terms of power are shown analytically and illustrated empirically. In addition, the proposed method is applied to check the stationarity assumption of a chemical process viscosity readings data.