Testing Structural Changes Using Ratio Type Statistics

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Abstract of the doctoral thesis

We deal with sequences of observations that are naturally ordered in time and assume various underlying stochastic models. These models are parametric and some of the parameters are possibly subject to change at some unknown time point. The main goal of this thesis is to test whether such an unknown change has occurred or not. The core of the change point methods presented here is in ratio type statistics based on maxima of cumulative sums.

Firstly, an overview of thesis' starting points is given. Then we focus on methods for detecting a gradual change in mean. Consequently, procedures for detection of an abrupt change in mean are generalized by considering a score function. We explore the possibility of applying the bootstrap methods for obtaining critical values, while disturbances of the change point model are considered as weakly dependent.

Procedures for detection of changes in parameters of linear regression models are shown as well and a permutation version of the test is derived. Then, a related problem of testing a change in autoregression parameter is studied. Finally, our interest lies in panel data of a moderate or relatively large number of panels, while the panels contain a small number of observations. Asymptotic and bootstrap testing procedures to detect a possible common change in means of the panels are established.

All the theoretical results are illustrated through simulations. Several practical applications of the developed procedures are presented on real data as well.

Keywords: change point, maximum type statistics, ratio type statistics, hypothesis testing, change in mean, abrupt change, gradual change, change in regression, change in autoregression, panel data, asymptotic distribution, robustness, bootstrap, weak dependence, block bootstrap