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Abstract

Title: Sequential change-point procedures based on U-Statistics

There are two different approaches in the context of change-point analysis. In the classical a-posteriori approach, a completely observed data set is available when starting the testing procedure. In the sequential change-point analysis we adapt tests for structural breaks after each observation while still controlling the type-1-error asymptotically. We propose a general framework of sequential testing procedures based on U-Statistics which, as an example, yields a robust sequential change-point procedure related to a Wilcoxon-type test statistic. The critical values can be obtained from the derived limit distribution under the null hypothesis and we show that the proposed tests have asymptotic power one. Sequential change point procedures naturally involve a certain detection delay as some data needs to be collected after the change to obtain statistical significance. The speed of detection is of particular importance for the sequential change-point analysis as, for example, monitoring patient or machine data requires an intervention as soon as possible after a structural break occurred. Therefore, we derive the asymptotic distribution of the corresponding stopping time. The performance of the testing procedures for finite sample sizes is assessed by a simulation study.