Change detection in INAR(p) processes and continuous branching models

Gyula Pap, Tamás T. Szabó

The p-th order INAR(p) process was introduced by Alzaid and Al-Osh in 19 87 for $p = 1$, and by Du and Li in 1991 in the case when p is an arbitrar y positive integer. It is a nonnegative integer-valued analogue of the AR(p) process and is widely used in time series analysis. The model has several parameters which influence the evolution of the process. If these parameter s change during our observations, then the parameter estimations and forecas ts based on the data will be wrong. Therefore it is important to detect chan ges in these parameters. In an earlier paper we introduced a test process fo r change detection in the case when the INAR(p) process has a unique stati onary distribution. The main result is that the test process converges in di stribution to a Brownian bridge. The consistency of the test and some proper ties of the change-point estimator have also been established. In this talk we aim to extend these some of these results to a special continuous-state b ranching process, which will be obtained as the solution of a stochastic dif ferential equation. The result is the first step in a project to construct t he correct analogues of existing discrete-time change detection methods for continuous-state branching processes.