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Title: Mixed Poisson INAR(1) processes

Abstract: Overdispersion is a phenomenon commonly observed in count time series. Since Poisson distribution is equidispersed, the INteger-valued AutoRegressive (INAR) process with Poisson marginals is not adequate for modelling overdispersed counts. To overcome this problem, we propose a general class of first-order INAR processes for modelling overdispersed count time series. The proposed INAR(1) processes have marginals belonging to a class of mixed Poisson distributions, which are overdispersed. With this, our class of overdispersed count models have the known negative binomial INAR(1) process as particular case and open the possibility of introducing new INAR(1) processes, such as the Poisson inverse-gaussian INAR(1) model. We establish a condition to our class of overdispersed INAR processes is well-defined and study some statistical properties. We propose estimators for the parameters and establish their consistency and asymptotic normality. A small Monte Carlo simulation to evaluate the finite-sample performance of the proposed estimators is presented and one application to a real data set illustrates the usefulness of our proposed overdispersed count processes.