A New Discrete-Time Series Model for Overdispersion

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Abstract

The classical Poisson first-order integer-valued autoregressive (INAR(1)) is a popular discrete time series model. Due to equality of mean and variance, it is inappropriate for data showing overdispersion (variance exceeding mean). Often, negative binomial innovation is used to tackle this case. The main contribution of this paper is to consider a few innovation processes in a mixture time series model, i.e. zero-inflated Poisson, geometric, negative binomial and new geometric distributions, which are well-known for overdispersion. The Expectation-Maximization (EM) algorithm is applied to estimate the parameters of the mixture model. An illustration with a real-life example is presented to show that the innovation processes are viable for discrete-time series analysis.

Keywords: Binomial thinning; mixture; overdispersion; zero-inflated; discrete-time series.