



Control Charts with Memory for Monitoring Integer-Valued Autocorrelated Processes

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Abstract:

In this work we propose and study exponentially weighted moving average (EWMA) charts for monitoring autocorrelated count data. The process is modelled according to a first order Binomial Autoregressive Conditional Heteroscedasticity (BINARCH(1)) model, which is a time series model for count data, with a finite range of possible values. This model is appropriate for modelling binomial observations with first order autocorrelation. Processes of this type appear frequently in practical problems in healthcare, industry and network security where the usual assumption of independent and identically distributed (IID) observations is violated. Also, the BINARCH(1) model is appropriate when count data have extra-binomial variation (or, overdispersion), compared to the usual binomial assumption. Using a Markov chain method, we evaluate the performance of the proposed charts, for different shifts in one or more process parameters. A real-data application of the proposed charts in data related to Eurozone inflation is also discussed.

Keywords:

Average run length; Eurozone inflation data; Overdispersion; Rounding operation; Statistical process monitoring.

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