

## Count data control charts for the surveillance of infectious diseases

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We present work on a new control chart for the change point detection in time series of counts – data, which typically arise in the routine surveillance of infectious diseases. The in-control mean in this statistical process control (SPC) setting is assumed to be time-varying and of generalized linear model (GLM) nature with intercept and seasonal components. Seasonality and count data nature are both important issues when adopting the standard change point techniques from SPC to the context of public health surveillance.

Using the generalized likelihood ratio (GLR) statistic [2] a monitoring scheme is formulated to detect on-line whether a shift in the intercept occurred. Both negative binomial and Poisson distributions are treated - in case of Poisson the necessary quantities of the GLR detector can be efficiently computed by recursive formulas. Extensions to autoregressive epidemic components such as in [3] or multivariate time series of counts are discussed. Using Monte Carlo simulations performance criterion e.g. average run length or probability of an alarm within a fixed number of time points can be computed.

The practicability of the charts is demonstrated by applying them to the observed number of salmonella hadar cases in Germany 2001-2006. An implementation of the presented methods is available through the R-package `surveillance` [4] obtainable from the Comprehensive R Archive Network (CRAN).

## References

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