

Title: Control charts for the statistical surveillance of infectious diseases

Abstract:

This talk presents a new control chart for monitoring time series of counts, which typically arise in the surveillance of infectious diseases. The in-control mean in this statistical process control setting is assumed to be time-varying and of generalized linear model (GLM) nature with intercept and seasonal components. If a shift in the intercept occurs the system goes out-of-control.

Using the generalized likelihood ratio (GLR) statistic 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 or multivariate time series are discussed.

Using Monte Carlo simulations run length properties of the proposed schemes are investigated. The practicability of the charts is demonstrated by applying them to the observed number of salmonella hadar cases in Germany and WHO rabies surveillance data for Hesse, Germany.