Sequential monitoring of high-dimensional time series

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Abstract

In the paper we derive new types of multivariate EWMA control charts which are based on the Euclidean distance and on the distance defined by using the inverse of the diagonal matrix consisting of the variances. The design of the proposed control schemes does not involve the computation of the inverse covariance matrix and, thus, it can be used in the high-dimensional setting. The distributional properties of the control statistics are obtained and are used in the determination of the new control procedures. Within an extensive simulation study, the new approaches are compared with the multivariate EWMA control charts which are based on the Mahalanobis distance.

Keywords: high-dimensional time series; sequential surveillance; vector autoregressive process; MEWMA control chart; maximum expected delay