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Robust Multivariate Control Charts Based on Convex Hulls

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Robust multivariate control charts are statistical tools used to monitor and control multiple correlated process variables simultaneously. Multivariate control charts are designed to detect and signal when the joint distribution of the process variables deviates from in-control levels, indicating a potential out-of-control case. The main goal of robust multivariate control charts is to provide a comprehensive on-line assessment of the overall process performance. They are particularly useful in industries while their use is expanded today in other domains such as public health monitoring. Various statistical techniques are applied to develop robust multivariate control charts, such as multivariate extensions of Shewhart, EWMA and CUSUM control charts. In this paper, we propose a robust multivariate control chart based on the notion of convex hull. The notion of convex hull comes from the domain of computational geometry, and it is used to describe the smallest convex polygon or polyhedron that contains all the points in a data set. Initial results of the proposed procedures give evidence of a very good performance under different real-life cases.

Keywords

Statistical Process Monitoring; Control Charts Convex Hull;

Classification

Mainly methodology

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