

Multivariate Process Monitoring and Control with R

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Simultaneously monitoring two or more quality characteristics depends on the development of more specific statistical tools to detect, identify and analyze the major causes of variability that affect the behavior of the production process. The multivariate control charts represent one of these emerging statistical techniques successfully used to monitor simultaneously several correlated characteristics that indicate the quality of a single production process. The use of graphics in the industrial environment has increased in recent years due to many resources of information technology now available to reduce the complexity of modern industrial processes. This article presents some computational routines developed in the GNU R package for the application of statistical control for multivariate processes based on the cumulative sum (MCUSUM) and exponentially weighted moving average (MEWMA). In order to reduce the number of variables Principal Components Analysis (PCA) was adopted making it possible to consider all of the original variables in only two or three dimensions. Thus, most of the variance of the process is represented by the dispersion of the points on the main components. The routines were developed in R in order to facilitate information entry to produce clear graphics and to return the maximum amount of information needed for process monitoring. The routines were applied successfully to data in the literature. While these routines can still be improved upon, we can conclude that the R environment is an important alternative for the diagnosis and monitoring of multivariate industrial processes.

References

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