# Forecast Monitoring via Multivariate Statistical Process Control with R

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In order to identify and analyze the major causes of variability that affect the accuracy of the forecast object simultaneously monitoring two or more forecasts depends on the development of specific statistical tools including graphics that support monitoring in real time. Procedures for calculating forecasts may depend upon purely subjective insight or upon statistical methods like Box-Jenkins or other computational methods such as neural networks and exponential smoothing models (R package **forecast**). In other words, the forecast model may be based upon either subjective or scientific principles. An important question involves the measurement of forecast accuracy and the determination of the relevance of forecasting model. The researcher must determine when a forecast error is disturbingly large, and how should the model be corrected to improve forecast accuracy. Statistical process control offers a series of monitoring tools for the analysis of quality characteristics, in this case the accuracy of forecasts. Multivariate control charts represent one of these emerging statistical techniques already successfully used to monitor simultaneously several correlated characteristics relevant to the 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 and as argued in this paper including the forecasting process. This article presents some computational routines developed in the GNU R package for the application of statistical control for multivariate processes of various simultaneous forecasts based on the cumulative sum (MCUSUM) control chart. The routines were developed in the R programing language in order to facilitate information entry to produce a clear graphics interface and to return the maximum amount of information needed for forecast monitoring. The routines were applied successfully to artificially simulated data and to real life examples. We can conclude that the R environment is an important alternative for the diagnosis and monitoring of multivariate forecasts.

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