

Competing projections techniques of multivariate quality data to monitor a production process

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Abstract

The change-point paradigm has been successfully applied to statistical process control by building many parametric and nonparametric charts for sequential monitoring. We concentrate here on a novel implementation of the change-point paradigm, based on dynamic windows, which forces comparisons only between samples of the same size. That implementation has been primarily applied to univariate control variables, despite many applications need to consider more than a single aspect of quality and to draw suitable information from their dependence structure. Thus, in this talk, we investigate the application of the dynamic-window approach to multivariate control variables. Essentially, we propose a preliminary reduction of the dimension of such variables and we evaluate different techniques of projection to the real line. We focus on the use of norms and inter-point distances. A comparison study is conducted to: i) identify such techniques which can provide stable results with respect to the actual dimension and the actual shape of the underlying distribution; ii) identify techniques which can provide a fast signal when some or all of the components of the underlying distribution undergo shifts in location or scale.

Keywords

Control charts, Dynamic-window approach, Dimension reduction, Inter-point distances.