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Distribution-free control charts based on order statistics and multiple runs: some advances

In this work, we study the behavior of nonparametric Shewhart-type control charts, which employ order statistics and multiple runs-type rules. The proposed class of monitoring schemes include some existing control charts. In addition, new distribution-free monitoring schemes that pertain to the class, are set up and examined extensively. Explicit expressions for determining the variability and the mean of the run length distribution for the enhanced control charts are additionally delivered. As an example, a real life managerial application is considered, where the proposed framework is implemented in order to enhance the provided services of a company under a supply chain management environment. Based on numerical comparisons, we draw the conclusion that the new charts outperform their competitors in identifying potential changes in the fundamental distribution in almost cases considered.

Special/ Invited session

Classification

Mainly methodology

Keywords

Nonparametric Statistical Process Control; order statistics; multiple runs

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