Nonparametric Control Charts for Detecting Shifts in Location and Scale based on new Lepage-type Statistics

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In this work we investigate the performance of Phase II nonparametric Shewhart- and CUSUM-type control charts based on two new Lepage-type statistics. Specifically, the first is based on van der Waerden and Ansari-Bradely tests while the second uses the Mood test instead of the Ansari-Bradley test. Using Monte Carlo simulation, we evaluate the performance of the considered charts in terms of their average run length and compare them with existing competitive nonparametric charts for joint monitoring, under different distributional models. In addition, we provide empirical rules for the statistical design of the proposed charts. The numerical results show that the proposed charts, especially those based on the van der Waerden and Mood tests, are viable alternatives to the existing monitoring schemes. Finally, we illustrate the implementation of the proposed charts in practice through a real-data example.

Keywords: Ansari-Bradley statistic, Average run length, Mood statistic, Nonparametric control charts, Van der waerden statistic

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