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On the Bootstrap P-Value Method in Identifying out of Control Signals in Multivariate Control Chart

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Abstract : In any production process, every product is aimed to attain a certain standard, but the presence of assignable cause of variability affects our process, thereby leading to low quality of product. The ability to identify and remove this type of variability reduces its overall effect, thereby improving the quality of the product. In case of a univariate control chart signal, it is easy to detect the problem and give a solution since it is related to a single quality characteristic. However, the problems involved in the use of multivariate control chart are the violation of multivariate normal assumption and the difficulty in identifying the quality characteristic(s) that resulted in the out of control signals. The purpose of this paper is to examine the use of non-parametric control chart (the bootstrap approach) for obtaining control limit to overcome the problem of multivariate distributional assumption and the p-value method for detecting out of control signals. Results from a performance study show that the proposed bootstrap method enables the setting of control limit that can enhance the detection of out of control signals when compared, while the p-value method also enhanced in identifying out of control variables.

Keywords : bootstrap control limit, p-value method, out-of-control signals, p-value, quality characteristics
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