ABSTRACT

In the field of statistics, the control charts are widely used as a process monitoring tool of the statistical process. The main objective in any production process is to maintain the quality of a product during manufacturing. There are number of control charting structures are available in literature used to evaluate production process. These control charts are designed under classical and Bayesian setups with respect to the nature of production process.

The relationship between the response and explanatory variables is known as the linear profiles. The relationship between the density specifications of a polymer and tensile strength can be an example of linear profiling containing one response and one explanatory variable. If this function contains only one variable then it will be simple linear profile. The present study is based on the memory-based control chart developed under the Bayesian setup for the monitoring of simple linear profiles model. The posterior estimates are obtained from posterior distributions that are derived using different conjugate priors for intercept, slope and errors variance. The prior distributions for intercept and slope parameters are selected as normal while for errors variance the inverse gamma prior is selected. The designed structure is based on the HWMA control chart for the monitoring of different profiles parameters after using the posterior estimates as an input statistics. The HWMA chart is designed for intercept first, then the designed structure for the monitoring of slope parameter and at the end HWMA chart for errors variance

The findings and conclusions are based on the simulation study using R language for the designed structures of HWMA charts for intercept, slope and errors variance under classical and Bayesian setups. A comprehensive comparative study is performed for EWMA-C, EWMA-BCP, HWMA-C and HWMA-BCP charts designed for intercept, slope and errors variance. To find the efficient values of the posterior parameters a sensitive analysis is also considered. The control charts are designed in such a way that the overall in-control average runs length is fixed at 200, 370 and 500. It is observed that with the increase of λ the values of ARL also increase while the values of ARL decrease with the increase in shifts. After observing the tables and graphical representations it is concluded that the proposed HWMA-BCP chart is dominating for detecting shifts in process parameters under Bayesian setup.