EWMA and MEWMA Control Charts for Monitoring Mean and Variance in Industrial Processes

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Abstract : There are many control charts for monitoring mean and variance. Among these, the X y R, X y S, S2 Hotteling and Shewhart control charts, for mentioning some, are widely used for monitoring mean a variance in industrial processes. In particular, the Shewhart charts are based on the information about the process contained in the current observation only and ignore any information given by the entire sequence of points. Moreover, that the Shewhart chart is a control chart without memory. Consequently, Shewhart control charts are found to be less sensitive in detecting smaller shifts, particularly smaller than 1.5 times of the standard deviation. These kind of small shifts are important in many industrial applications. In this study and effective alternative to Shewhart control chart was implemented. In case of univariate process an Exponentially Moving Average (EWMA) control chart was developed and Multivariate Exponentially Moving Average (MEWMA) control chart in case of multivariate process. Both of these charts were based on memory and perform better that Shewhart chart while detecting smaller shifts. In these charts, information the past sample is cumulated up the current sample and then the decision about the process control is taken. The mentioned characteristic of EWMA and MEWMA charts, are of the paramount importance when it is necessary to control industrial process, because it is possible to correct or predict problems in the processes before they come to a dangerous limit.

Keywords : control charts, multivariate exponentially moving average (MEWMA), exponentially moving average (EWMA), industrial control process

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