



Contribution ID: 12

Type: **not specified**

The EWMA Control Chart for Monitoring the Ratio of Variances

Monday, 16 September 2024 15:15 (20 minutes)

This article constructs a control chart for monitoring a ratio of two variances within a bivariate-distributed population. For an in-control process, we assume the in-control two variances and the covariance of the bivariate-distributed population are known. The ratio of two variances is equivalent to a difference of the two variances. An unbiased estimator of the difference between the two sample variances is provided, and its mean and variance are derived. The new ratio control chart is thus developed accordingly. We investigate the properties and detection performance of the proposed ratio control chart by some numerical analyses. Whether the sample size is small or large, we demonstrate that the control chart provided correct process monitoring information and quickly out-of-control detection ability.

A real example of monitoring the ratio of variances within a bivariate-distributed population adopting a semiconductor data set demonstrates the application of the proposed ratio control chart.

Type of presentation

Talk

Classification

Mainly methodology

Keywords

control chart, bivariate distribution, ratio of variances, detection performance.

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