

## An integrated mewma-ann scheme towards balanced monitoring and accurate diagnosis of bivariate process mean shifts

### Abstract

Various artificial neural networks (ANN)-based pattern recognition schemes have been developed for monitoring and diagnosis of bivariate process variation in mean shifts. In comparison with the traditional multivariate statistical process control (MSPC) charts, these advanced schemes generally perform better in identifying process mean shifts and provide more effective information towards diagnosing the root causes. However, it seems less effective for multivariate quality control (MQC) application due to disadvantages in reference bivariate patterns and imbalanced monitoring performance. To achieve 'balanced monitoring and accurate diagnosis', this study proposes an integrated multivariate exponentially weighted moving average (MEWMA)-ANN scheme for two-stages monitoring and diagnosis of some reference bivariate patterns. Raw data and statistical features input representations were applied into training of the Synergistic-ANN recognizer for improving patterns discrimination capability. The proposed scheme has resulted in better monitoring – diagnosis performances with smaller false alarm, quick mean shift detection and higher diagnosis accuracy compared to the basic scheme.