

Adaptive multivariate regression modeling based on model performance assessment

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Multivariate regression techniques such as partial least squares (PLS) and principal component regression (PCR) have been successfully used in modeling of chemical processes for monitoring and diagnosis. However, the troublesome update of the regression model is essentially required to adapt process changes. In this paper, a novel adaptive modeling method is proposed based on assessment of the model performance. The model performance is block-wise assessed with multiple cumulative-sum (CUSUM) charts for two performance measures. The adaptive modeling proceeds with an alternative of two updating styles, adjustable or complete one depending on the assessment result of the model performance. The proposed method is applied to predicting NOX emissions from an industrial fired heater. The performance measures can earlier indicate an updating point of time rather than a popular performance criterion, root mean square error of prediction (RMSEP) based approach. The proposed adaptive modeling approach based on the criteria demonstrated better prediction accuracy by about 25 % than batch-wise modeling approach.