

## Process monitoring based on Gaussian mixture models from incomplete data

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This research is about methods of probabilistic data modeling and the model based process monitoring from incomplete data. Statistical machine learning technique is used to the modeling, and statistical test of a sample with respect to the model is devised to the monitoring. Since decision of process condition should be made by its model, the first step is building models. However, there are two main issues in this step: the one is incompleteness of the samples collected, and the other is nonlinear attributes among elements in the sample. Expectation and maximization (EM) algorithm can provide efficient way to treat the both issues. The next step is making statistical decision of the event tested by the model. All the decisions must be made by Mahalanobis distance measure. But since well-known projection models are designed to find least-square sense optimal solution via NIPALS algorithm, Euclidian distance measure is used. However, since probabilistic models are devised to get likelihood sense optimal solution via iterative likelihood maximization algorithm, i.e. EM, Mahalanobis distance is utilized as the measuring unit and hence simplifying the tests.