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Dynamically synchronizing production data for industrial soft-sensors

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The application of statistical regression models in (bio)chemical industry as soft-sensors is becoming more and more popular with the increasing amounts of data collected. Such sensors can predict the critical properties of the product that signify the production quality from process variables. As these variables are much quicker and easier to measure than a traditional wet chemical analysis is, a soft sensor can greatly improve control of a production process. A key requirement for soft sensors is that all data is synchronized in time. This requirement is often not met, as the data is measured at different physical locations at different intervals. In this study, we critically compare different methods for dynamic data synchronization, both from literature and newly introduced. We show that the choice of synchronization method has a significant impact on the accuracy of a soft sensor. We furthermore introduce a data-driven strategy for optimizing the dynamic synchronization method per process variable for a soft sensor. Using this strategy, the prediction of molecular properties of the product for two different example cases could be significantly improved. These improved predictions will ultimately enable the plant operators to better steer the production and guarantee consistent and high quality product.

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