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Titre : Predictive Business Process Monitoring Considering Reliability Estimates

The study discusses the use of predictive monitoring to improve business processes, focusing on the importance of considering how reliable these forecasts are in order to proactively adjust processes. The study examines how estimating forecast reliability can help reduce costs, focusing on the fields of transport and logistics. The aim is to prove through experiments that reliable forecasts really can help make better decisions when it comes to adapting to changes in business processes.

The abstract highlights the importance of prediction reliability estimates in the predictive monitoring of business processes. It explains how these estimates offer more detailed information on individual prediction errors compared to aggregate accuracy metrics, and discusses their calculation methods, including through ensemble prediction techniques.
The study shows different approaches to taking costs into account in predictive business process monitoring and proactive process adaptation. For example, using cost-aware learning techniques to reduce prediction errors, and incorporating these costs into decision-making to proactively adapt processes. Reliability estimates affect error rates and costs in business processes even if according to the tests, proactive process adjustment generally improved costs in 52.5% of cases. In 82.9% of these cases, the integration of reliability estimates reinforced this positive impact, delivering cost savings ranging from 2% to 54%, with an average of 14%.
The study highlights the implementation of predictive models using artificial neural networks (ANNs) to predict violations in the Cargo 2000 transport and logistics process. When using ensemble prediction techniques such as bagging to train artificial neural networks (ANNs), it is advantageous to take reliability estimates into account. Bagging generates new training data sets by sampling the training data set uniformly and with replacement. For each new training data set, an individual prediction model is trained. Studies show that incorporating these reliability estimates improves overall prediction accuracy, especially when reliability thresholds are higher. However, analysis of non-violation rates as a function of reliability thresholds and adaptation efficiency shows different results, indicating that greater adaptation efficiency can lead to lower non-violation rates when reliability estimates are taken into account. These findings highlight the importance of striking a balance between reliability estimates and adaptation efficiency when proactively adjusting processes.