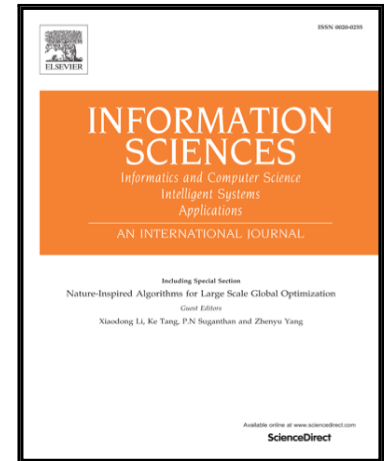


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Streaming Feature-based Causal Structure Learning Algorithm with Symmetrical Uncertainty

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Abstract

Most existing causal structure learning algorithms must have access to the entire feature set of a dataset during the learning process. However, in many real-world applications, rather than having access to an entire feature set before learning begins, features are generated in an online manner. Learning and analyzing these dynamic features online is in high demand for effective decision-making. In this paper, by modeling these dynamic features as streaming features, we propose the CSSU algorithm, a streaming feature-based casual structure learning algorithm with symmetrical uncertainty. Specifically, the CSSU algorithm performs online updates of the candidate neighbor nodes of each feature seen so far using proposed definitions of the dependence relationship and pseudo-dependence relationship and adopts a constrained greedy search to obtain the final causal structure when no new features are available. The CSSU algorithm obtains candidate neighbors with symmetrical uncertainty to avoid subset searches to execute the conditional independence (CI) test, which significantly reduces the time complexity. Using seven benchmark Bayesian networks, the experimental results show that the CSSU algorithm improves on other state-of-the-art causal structure leaning algorithms with regard to learning accuracy

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