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Causal Rules Extraction in Time Series Data

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The number of complex infrastructures in an industrial setting is growing and is not immune to unexplained recurring events such as breakdowns or failure that can have an economic and environmental impact. To understand these phenomena, sensors have been placed on the different infrastructures to track, monitor, and control the dynamics of the systems. The causal study of these data allows predictive and prescriptive maintenance to be carried out. It helps to understand the appearance of a problem and find counterfactual outcomes to better operate and defuse the event. In this paper, we introduce a novel approach combining the case-crossover design which is used to investigate acute triggers of diseases in epidemiology, and the Apriori algorithm which is a data mining technique allowing to find relevant rules in a dataset. The resulting time series causal algorithm extracts interesting rules in our application case which is a non-linear time series dataset. In addition, a predictive rule-based algorithm demonstrates the potential of the proposed method.

Keywords

Causality, Time Series, Data Mining

Special/invited session

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