World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:17, No:05, 2023

Identification of Bayesian Network with Convolutional Neural Network

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Abstract : In this paper, we propose an alternative method to construct a Bayesian Network (BN). This method relies on a convolutional neural network (CNN classifier), which determinates the edges of the network skeleton. We train a CNN on a normalized empirical probability density distribution (NEPDF) for predicting causal interactions and relationships. We have to find the optimal Bayesian network structure for causal inference. Indeed, we are undertaking a search for pair-wise causality, depending on considered causal assumptions. In order to avoid unreasonable causal structure, we consider a blacklist and a whitelist of causality senses. We tested the method on real data to assess the influence of education on the voting intention for the extreme right-wing party. We show that, with this method, we get a safer causal structure of variables (Bayesian Network) and make to identify a variable that satisfies the backdoor criterion.

Keywords : Bayesian network, structure learning, optimal search, convolutional neural network, causal inference
Conference Title : ICS 2023 : International Conference on Statistics
Conference Location : Vancouver, Canada
Conference Dates : May 22-23, 2023