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# Assessing Conditional Independence in Directed Acyclic Graphs (DAGs)

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Causal inference based on Directed Acyclic Graphs (DAGs) is an increasingly popular framework for helping researchers design statistical models for estimating causal effects. A causal DAG is a graph consisting of nodes and directed paths (arrows). The nodes represent variables one can measure, and the arrows indicate how the variables are causally connected. The word acyclic means there can be no loops or feedback in the DAG, meaning causality flows in one direction (w.r.t. time).

Any DAG comes with a set of implied (and testable) statistical conditions in the form of marginal and conditional independencies. However, testing of these statistical conditions is rarely reported in applied work. One reason could be that there are few straightforward, easily accessible ways for researchers to test conditional independence. Most existing methods apply only to specific cases, are not well known, or are difficult for the general practitioner to implement. In addition, there are some theoretical challenges to testing CI in DAGs with these methods.

I will present a new method called Bootstrapped Conditional Independence Analysis (BOOCOIN). This non-parametric procedure aims to handle complex data-generating processes, different data types, and small sample sizes. The method is compared to existing methods through simulations. The results show that BOOCOIN is an excellent tool for assessing implied conditional independencies in DAGs and it avoids some of the theoretical challenges in CI testing.

## Keywords

Directed Acyclic Graphs, Causal Inference, Modelling

## Classification

Mainly methodology

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