TITLE: Bayesian Parametric G-Formula as a Sensitivity Analysis for Causal Inference

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ABSTRACT:

Inverse probability of treatment weighting (IPTW) is widely used in causal inference to estimate treatment effects from observational data. IPTW is susceptible to model misspecification which can lead to biased estimates. Correctly modelling confounding is necessary for valid causal inferences. If a confounder is not correctly modelled, residual confounding can occur which may bias the effect estimate. The impact of residual confounding is typically restricted to the limitations section of a research article. Quantifying the potential residual confounding may be useful in determining the robustness of results.
Through a simulation study, the use of the Bayesian parametric g-formula as a sensitivity analysis is assessed. Informative priors for the model are incorporated to reflect existing knowledge regarding the strength of confounding of each specific variable. Several scenarios are explored including different continuous probability distributions for the confounder-outcome relationship. The results from these scenarios are then compared to the effect estimated using IPTW.
Comparing estimates from IPTW and the Bayesian parametric g-formula allows for an assessment of the robustness of causal effect estimates to residual confounding. This approach offers a practical solution for researchers to ensure the validity of findings.