Causal Inference about Mediation when there are Several Mediators

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In the context of randomized intervention trials of behavior science, the typical objective is to understand how the effect of an intervention operates on a primary outcome through potential mediating variables. Often there is more than one mediation path, and the relations between potential mediating variables suggest that the multiple mediator model is more of interest than the single mediator model. We develop a model to infer separately the mediation effects for individual variables when there are several potential mediators. A causal model, parameterized in terms of natural direct and indirect effects (Pearl, 2001), is used to encode mediation. To identify the natural indirect effects, we require information about the joint potential outcomes distribution of each mediator. Our model identifies this joint distribution using information from baseline covariates and by placing targeted restrictions the correlation structure of the potential mediators. Unobserved potential mediators and associated potential outcomes can therefore be imputed under the model, and causal contrasts of interest can be computed in a straightforward manner. We illustrate our methods in both simulation studies and an analysis of a recent intervention trial designed to increase physical activity.

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