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Half-Trek Criterion for Identifiability of Latent Variable Models

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Linear structural equation models relate random variables of interest via a linear equation system that features stochastic noise. Each model corresponds to a directed graph whose edges represent the non-zero coefficients in the equation system. Prior research has developed a variety of methods to decide parameter identifiability in models with latent variables. Identifiability holds if the coefficients associated with the edges of the graph can be uniquely recovered from the covariance matrix they define. The methods usually operate in a latent projection framework where the confounding effects of the latent variables are represented by correlation among noise terms and this approach is effective when latent confounding is sparse. In this talk I will present a new combinatorial criterion for parameter identifiability that operates on the original unprojected latent variable model and is able to certify identifiability in settings, where some latent variables may also have dense effects on many or even all of the observables.

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