Causal Discovery with Graphical Models

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Abstract:
Causal discovery is the problem of inferring cause-effect relationships among a set of variables on the basis of multivariate data, where these variables are jointly observed. Common methods to tackle this problem are based on directed graphical models, which are able to tractably capture stochastic dependencies resulting from the causal relations. In this framework, methods for causal discovery solve the model selection problem of inferring the graph underlying the directed graphical model. In the talk, I will review key ideas in causal discovery, such as exploiting conditional independences among the variables or special functional forms of causal relations. The ideas will be exemplified via recent projects that develop methods to cope with the presence of latent variables and methods to supply statistical confidence statements for discovered causal effects. The specific focus will be on a local version of popular algorithms that test conditional independences, and methods based on linear non-Gaussian models.

Keywords:
Bayesian network, causal effect, directed graphical model, model selection, structure learning