Nested Markov Properties for Acyclic Directed Mixed Graphs

Thomas Richardson
University of Washington

An acyclic directed mixed graph (ADMG) contains directed and bi-directed edges subject to the restriction that there are no directed cycles. ADMGs have been used to represent the conditional independence relations implied by a DAG with hidden variables on the distribution of the observed variables. However, it has long been understood that there are additional non-parametric constraints that arise directly from the factorization given by a partially observed DAG that do not correspond to conditional independence restrictions, such as the "Verma constraint". In this talk I will show that such constraints may be viewed as conditional independence restrictions in re-weighted distributions. I will introduce a 'nested' Markov property for ADMGs which implies these constraints. These re-weighted distributions have a natural causal interpretation in the context of the underlying DAG model.