SA Conditional Dependence Measure with Applications to

Undirected Graphical Models

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Measuring conditional dependence is an important topic in statistics with broad applications including graphical models. Under a factor model setting, a new conditional dependence measure is proposed. The measure is derived by using distance covariance after adjusting the common observable factors or covariates. The corresponding conditional independence test is given with the asymptotic null distribution unveiled. The latter gives a somewhat surprising result: the estimating errors in factor loading matrices, while of root-n order, do not have material impact on the asymptotic null distribution of the test statistic, which is also in the root-n domain. It is also shown that the new test has correct control over the asymptotic significance level and can be calculated efficiently. A generic method for building dependency graphs using the new test is elaborated. Numerical results and real data analysis show the superiority of the new method.

(Joint work with Yang Feng and Lucy Xia)