Invited talk

Causal discovery using non-Gaussian Bayesian networks

Aapo Hyvärinen

Abstract: Finding causal relations between observed data variables is an important task in analysis of scientific data as well as in cognitive processing. In recent years, new methods have been proposed for the discovery of causal structure from passively observed data, often based on the formalism of Bayesian networks. Such methods make various assumptions on the data generating process to enable its identification. Continuing this line of research, we have shown how to discover the complete causal structure of continuous-valued data, under the assumptions that (a) the relations between the variables are linear, (b) there are no unobserved relevant variables, and (c) variables modelling external influences to the system have non-Gaussian distributions. The solution relies on the use of the statistical method known as independent component analysis, and does not require any pre-specified time-ordering of the variables. In contrast to previous linear networks, we can learn (estimate) the strengths of all the influences because of the powerful assumption of non-Gaussianity.