

Covariance chains

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Covariance matrices which can be arranged in tridiagonal form are called covariance chains. They are used to clarify some issues of parameter equivalence and of independence equivalence for linear models in which a set of latent variables influences a set of observed variables. For this purpose, orthogonal decompositions for covariance chains are derived first in explicit form. Covariance chains are also contrasted to concentration chains, for which estimation is explicit and simple. For this purpose, maximum-likelihood equations are derived first for exponential families when some parameters satisfy zero value constraints. From these equations explicit estimates are obtained, which are asymptotically efficient, and they are applied to covariance chains. Simulation results confirm the satisfactory behaviour of the explicit covariance chain estimates also in moderate-sized samples.

Keywords: canonical parameters; exponential families; graphical chain models; independence equivalence; latent variables; linear least-squares regressions; moment parameters; orthogonal decompositions; parameter equivalence; reduced models; structural equation models