

Compromise Factor Analysis

Marianna Bolla, Technical University of Budapest.

ABSTRACT

A method for compromise factor extraction from covariance/correlation matrices corresponding to different strata is introduced. Compromise factors are independent and on this constraint they explain the largest possible part of the variables' total variance over the strata. In applications, data are frequently derived from different strata, but the observed variables are the same in each of them. The analysis is based on a matrix decomposition discussed in [2]. As a result of the analysis, we assign scores to the variables – different ones in different strata – and the coefficients of the variables in the factors are regarded as factor loadings. On the basis of these loadings the factors can be identified by the expert as in the case of the usual factor analysis with one covariance matrix.

Binary samples are also investigated. The so-called compromise representation of the strata is introduced. For this purpose the hypergraph representation technique of [1] is used. On the basis of incidence matrices describing the data, Laplacians of the strata are calculated (they are symmetric, positive semidefinite matrices and their eigenvectors are used in the representation of the variables). As a result, the variables are represented with real numbers in each stratum separately. The one-dimensional representatives are regarded as scores of the variables in the strata and can be explained as in the previous case.

References

- [1] M. Bolla, “Spectra, Euclidean representations and clusterings of hypergraphs”, *Discrete Mathematics* 117 (1993), 19–39.
- [2] M. Bolla, Gy. Michaletzky, G. Tusnády, M. Ziermann, “Extrema of Sums of Heterogeneous Quadratic Forms”, *Linear Algebra and its Applications* 269 (1998), 331–365.

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Contact Address: marib@math.bme.hu