

Factor analysis and outliers: A Bayesian approach

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Abstract

Classical factor analysis decomposes n observations of dimension p into $K (< p)$ orthogonal factors. In a Bayesian approach we decompose the observation matrix into a product of a factor score and a factor loading matrix of unknown rank by using a normal-Wishart conjugate density family. We assume an informative prior and show how the posterior distribution can be simulated in multivariate blocks by a Gibbs sampling algorithm. The number of factors is determined using the ordinary marginal likelihood and the posterior marginal likelihood criteria.

Furthermore, the sensitivity of the factor analysis with respect to outliers in the data set is explored. Assuming additive outliers, a Gibbs sampling approach is suggested for a multivariate outlier model in extension of the approach of Verdinelli and Wasserman (1991). The approach is demonstrated for the language data set of Fuller (1987).

References

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Verdinelli, I. and Wasserman, L. (1991) Bayesian analysis of outlier problems using the Gibbs sampler, *Statistics and Computing*, 1991-1, 105-117.