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Research article

A Bayesian approach on asymmetric heavy tailed mixture of factor analyzer

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Abstract: A Mixture of factor analyzer (MFA) model is a powerful tool to reduce the number of free parameters in high-dimensional data through the factor-analyzer technique based on the covariance matrices. This model also prepares an efficient methodology to determine latent groups in data. In this paper, we use an MFA model with a rich and flexible class of distributions called hidden truncation hyperbolic (HTH) distribution and a Bayesian structure with several computational benefits. The MFA based on the HTH family allows the factor scores and the error component can be skewed and heavy-tailed. Therefore, using the HTH family leads to the robustness of the MFA in modeling asymmetrical datasets with/without outliers. Furthermore, the HTH family, because of several desired properties, including analytical flexibility, provides steps in the estimation of parameters that are computationally tractable. In the present study, the advantages of MFA based on the HTH family have been discussed and the suitable efficiency of the introduced MFA model has been demonstrated by using real data examples and simulation.

Keywords: Bayesian; hidden truncation hyperbolic distributions; MCMC method; mixture of factor analyzer model; Skewed family; hyperbolic distributions; data science; soft computing
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