Estimation of parameters under the multilevel multivariate models

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Abstract

The complexity of data has increased greatly over the last decade. Modern experimental techniques make it possible to collect and store multi-level multivariate data in almost all fields, in which several characteristics can be observed on more than one response variable at different locations, repeatedly over time, at different depths, etc. Such data can be presented in the form of a multi-index matrix (tensor) $\mathcal{Y}$. The third-order normally distributed tensor of observations, $\mathcal{Y} \in \mathbb{R}^{n\times p\times q}$ is discussed with the mean structured in the form of a generalized growth curve model, $[\![\mathcal{X}; \mathbf{A}, \mathbf{B}, \mathbf{C}]\!]$, with multiplication in all three directions of the third-order tensor $\mathcal{X}$ of unknown parameters by the known matrices $\mathbf{A}$, $\mathbf{B}$ and $\mathbf{C}$. We present the estimation of an unknown tensor $\mathcal{X}$ of direct effects and a separable and doubly separable variancecovariance matrix.

References

[1] Filipiak, K. and D. Klein (2017). Estimation of parameters under a generalized growth curve model. *J. Multivariate Anal. 158*, 73–86.