

L models and multiple regressions designs

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Abstract

Given an orthogonal model

$$\hat{\mathbf{y}} = \sum_{i=1}^w \mathbf{X}_i \beta_i + \hat{\mathbf{e}}$$

an L model

$$\mathbf{y} = \mathbf{L} \left(\sum_{i=1}^w \mathbf{X}_i \beta_i + \mathbf{e} \right)$$

is obtained, and the only restriction is the linear independency of the column vectors of matrix \mathbf{L} . Special cases of the models correspond to blockwise diagonal matrices $\mathbf{L} = \mathbf{D}(\mathbf{L}_1, \dots, \mathbf{L}_{\hat{n}})$.

In multiple regression designs this matrix will be of the form

$$\mathbf{L} = \mathbf{D}(\tilde{\mathbf{X}}_1, \dots, \tilde{\mathbf{X}}_{\hat{n}})$$

with $\tilde{\mathbf{X}}_j$, $j = 1, \dots, \hat{n}$ the model matrices of the individual regressions, while the original model will have fixed effects. In this way, we overcome the usual restriction of requiring all regressions to have the same model structure.

Keywords

Orthogonal models, L models, Multiple regression designs.

References

- Fonseca, M., J.T. Mexia, and R. Zmyślony (2007). Jordan algebras, generating pivot variables and orthogonal normal models. *J. Interdiscip. Math.* 2, 305–326.
- Fonseca, M., J.T. Mexia, and R. Zmyślony (2006). Binary operations on Jordan algebras and orthogonal normal models. *Linear Algebra Appl.* 417, 75–86.
- Lehmann, E.L. and G. Casella (1998). *Theory of Point Estimation*. New York: Springer.
- Mexia, J.T. (1995). *Introdução à Inferência Estatística Linear*. Edições Universitárias Lusófonas - Lisboa.

- Mexia, J.T. (1987). Multi-Treatment Regression Designs. Trabalhos de Investigação N°1 - Faculdade de Ciências e Tecnologia - Universidade Nova de Lisboa
- Moreira E.E., A.B. Ribeiro, E.P. Mateus, J.T. Mexia, and L.M. Ottosen (2005). Regressional modeling of electrodialytic removal of Cu, Cr and As from CCA timber waste: application to sawdust. *Wood Science and Technology* 39, 291–309.
- Moreira E.E., A.B. Ribeiro, E.P. Mateus, J.T. Mexia, and L.M. Ottosen (2006). Regressional modeling of electrodialytic removal of Cu, Cr and As from CCA timber waste: application to wood chips. *Biom. Lett.* 42, 11–25.