On nonnegative minimum biased quadratic estimation in the linear regression models

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Abstract

The problem of nonnegative estimation of a parametric function $\gamma(\beta, \sigma) = \beta' H \beta + h\sigma^2$ in the linear regression model $\mathcal{M}\{y, X\beta, \sigma^2 I\}$, where H is a nonnegative definite matrix and h is a nonnegative scalar, attracted attention of many researchers. Gnot et al. [2] proposed an approach in which γ is estimated by a quadratic form $y'Ay$, where A is a nonnegative definite matrix that satisfies an appropriate optimality criterion associated with minimizing the bias of the estimator. Computing the matrix A, which in the general case is not given explicitly, may be challenging.

A comparison of various approaches for finding A (developed e.g. in [2, 1, 3]) will be presented. The efficiency of these approaches will be illustrated by numerical examples.

Keywords

Linear regression model, Nonnegative minimum biased estimators, Mean squared error.

References

[1] Gnot, S., Knautz, H. and G. Trenkler (1994). Using nonnegative minimum biased quadratic estimation for variable selection in the linear regression models. In: T. Caliński and R. Kala (Eds.), *Proceeding of the International Conference on Linear Statistical Inference LINSTAT '93* (pp. 65–71). Springer.

[2] Gnot, S., Trenkler, G. and R. Zmyślony (1995). Nonnegative minimum biased quadratic estimation in the linear regression models. *J. Multivariate Analysis 54*, 113–125.

[3] Grządziel, M. (1995). A simulation study of a new variable selection strategy based on minimum biased quadratic estimation. *Discussiones Mathematicae 15*, 325–334.