An improved Wald test in proper dispersion models

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The proper dispersion models (PDM; Jørgensen, 1997) contain several important non-exponential models, for instance the von Mises regression model for data distributed along the unit circle and the simplex model for data distributed in the standard unit interval $(0, 1)$. In this work, we find the second-order covariance matrix of the bias-corrected maximum likelihood estimator of the regression parameter β in PDM. Based on the obtained second-order covariance matrix, we modify the Wald test, improving its performance. We evaluate the result by using a Monte Carlo simulation and apply the expression of the modified Wald test to a real data set.

Keywords: Bias estimator, Covariance matrix, Improved Wald test.

References:

Jørgensen, B. (1997). Proper dispersion models (with discussion), *Brazilian Journal of Probability and Statistics 11*, 89–140.