Lin, Shang P.; **Perlman, Michael D.**

A Monte Carlo comparison of four estimators of a covariance matrix. (English)

Zbl 0593.62051

Multivariate analysis, Proc. 6th Int. Symp., Pittsburgh/Pa. 1983, Multivariate Anal. 6, 411-429 (1985).

Summary: [For the entire collection see Zbl 0572.00016.]

Three alternative estimators of a multivariate normal covariance matrix are compared to the usual estimator (the sample covariance matrix) under two loss functions by means of a Monte-Carlo experiment. For small and moderate sample sizes, the characteristic roots method of *C. Stein* [Estimation of a covariance matrix. Rietz Lect., Annual Meet. Inst. Math. Stat., Atlanta (1975) and Zap. Nauchn. Semin. Leningr. Otd. Mat. Inst. Steklova 74, 4-65 (Russian) (1977; Zbl 0421.62036); English translation in J. Sov. Math. 34, 1373-1403 (1986)] and the correlation matrix method of the first author [Improved procedures for estimating a correlation matrix. Ph. D. thesis, Dpt. Stat. Univ. Chicago (1977)] and the present authors [Statistical theory and data analysis, Proc. 1st Pac. Area Stat. Conf., Tokyo 1982, 369-379 (1985; Zbl 0577.62050)] are seen to provide substantial improvement in risk over the usual estimator for a wide range of covariance structures, while the empirical Bayes method [see *L. R. Haff*, Ann. Stat. 8, 586-597 (1980; Zbl 0441.62045)] offers less improvement.

MSC:

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Keywords:

comparison of estimators; multivariate normal covariance matrix; sample covariance matrix; loss functions; Monte-Carlo experiment; characteristic roots method; correlation matrix method; empirical Bayes method