ESTIMATION OF THE COEFFICIENT OF MULTIPLE DETERMINATION

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Abstract. Assume that we have *iid* observations on the random vector $\boldsymbol{X} = (X_1, \ldots, X_p)'$ following a multivariate normal distribution $N_p(\mu, \Sigma)$ where both $\mu \in \mathcal{R}^p$ and $\Sigma(p.d.)$ are unknown. Let $\rho_{1\cdot 23\cdots p}$ denote the multiple correlation coefficient between X_1 and $(X_2, \ldots, X_p)'$. The parameter $\lambda = \rho^2_{1\cdot 23\cdots p}$, called the multiple coefficient of determination, indicates the proportion of variability in X_1 explained by its best linear fit based on $(X_2, \ldots, X_p)'$. In this paper we consider the point estimation of λ under the ordinary squared error loss function. The usual estimators (MLE, UMVUE) have complicated risk expressions and hence it is quite difficult to get exact decision-theoretic results. We therefore follow the asymptotic decision theoretic approach (as done by Ghosh and Sinha (1981, Ann. Statist., **9**, 1334–1338)) and study 'Second Order Admissibility' of various estimators including the usual ones.

Key words and phrases: Multiple correlation coefficient, loss function, risk function, second order admissibility.