MEAN SQUARED PREDICTION ERROR IN THE SPATIAL LINEAR MODEL WITH ESTIMATED COVARIANCE PARAMETERS

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Abstract. The problem considered is that of predicting the value of a linear functional of a random field when the parameter vector $\boldsymbol{\theta}$ of the covariance function (or generalized covariance function) is unknown. The customary predictor when $\boldsymbol{\theta}$ is unknown, which we call the EBLUP, is obtained by substituting an estimator $\hat{\boldsymbol{\theta}}$ for $\boldsymbol{\theta}$ in the expression for the best linear unbiased predictor (BLUP). Similarly, the customary estimator of the mean squared prediction error (MSPE) of the EBLUP is obtained by substituting $\hat{\boldsymbol{\theta}}$ for $\boldsymbol{\theta}$ in the expression for the BLUP's MSPE; we call this the EMSPE. In this article, the appropriateness of the EMSPE as an estimator of the EBLUP's MSPE is examined, and alternative estimators of the EBLUP's MSPE for use when the EMSPE is inappropriate are suggested. Several illustrative examples show that the performance of the EMSPE depends on the strength of spatial correlation; the EMSPE is at its best when the spatial correlation is strong.

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