

# Parameter estimation for variograms of stationary isotropic spatial processes.

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## Abstract

In many fields of science dealing with geostatistical data, the weighted least squares proposed by Noel Cressie remains a popular choice for variogram estimation. The main advantages of this distance minimizing idea lie in its simplicity (yet rigour) and the fact that it does not necessitate the scientist to make distributional assumptions on the random process and is easily implemented. It also avoids the heavy computational burden of Generalized least squares. But that comes at the cost of loss of information due to the use of a diagonal weight matrix. Besides, the parameter dependent weight matrix makes the estimating equations biased. In this paper we propose two alternative weight matrices which do not depend on the parameters. We show that one of the weight matrices gives parameter estimates with lower asymptotic variance and also has asymptotically unbiased estimating equations. The observations are validated using simulation and real data.

**Keywords:** variance stabilisation, Matern class, wave variogram, cross-validation kriging.