

Title: Nonparametric Kriging Method Using the Generalized Additive Model (GAM)

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Degree: Master of Statistics

Date: April 2008

Abstract:

Constraints imposed by the assumptions of the Gaussian process and stationarity limit the application of parametric kriging in spatial interpolation. This study investigates nonparametric kriging as a viable alternative to the parametrically constrained method. The interpolation problem is postulated as a generalized additive model (GAM) and estimated via spline backfitting. Two types of data, symmetric and skewed, are simulated for this investigation. Symmetric data satisfy the two assumptions imposed by the parametric kriging method. These data are used in evaluating the performance of the nonparametric kriging against the parametric method. Descriptive statistics of the respective MAPEs and RMSEs are used as performance measures. Skewed data are used to explore the viability of using the nonparametric kriging in spatial interpolation when the parametric method is inappropriate due to violation of the assumptions. Both nonparametric kriging using the GAM and parametric kriging method suffer from edge defects. Gross overestimation of low values located near the edges of the grid is committed. Nonetheless, nonparametric kriging performs better than or as efficient as the parametric method when the data is of low magnitude but high variability and come from the population simulated in a smaller grid. Nonparametric kriging performs efficiently even with data coming from skewed distribution especially in the empirical variogram is of type 1 and type 4.