

Variogram Fitting Based on the Wilcoxon Norm

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Abstract : Within geostatistics research, effective estimation of the variogram points has been examined, particularly in developing robust alternatives. The parametric fit of these variogram points which eventually defines the kriging weights, however, has not received the same attention from a robust perspective. This paper proposes the use of the non-linear Wilcoxon norm over weighted non-linear least squares as a robust variogram fitting alternative. First, we introduce the concept of variogram estimation and fitting. Then, as an alternative to non-linear weighted least squares, we discuss the non-linear Wilcoxon estimator. Next, the robustness properties of the non-linear Wilcoxon are demonstrated using a contaminated spatial data set. Finally, under simulated conditions, increasing levels of contaminated spatial processes have their variograms points estimated and fit. In the fitting of these variogram points, both non-linear Weighted Least Squares and non-linear Wilcoxon fits are examined for efficiency. At all levels of contamination (including 0%), using a robust estimation and robust fitting procedure, the non-weighted Wilcoxon outperforms weighted Least Squares.

Keywords : non-linear wilcoxon, robust estimation, variogram estimation, wilcoxon norm

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