

GM(1,1)-Kriging Prediction of Soil Dioxin Pattern

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Abstract

Environmental data is very costly and difficult to collect, and quite often the sampled data are insufficient for further analysis. Kriging is a commonly accepted spatial analysis method. The feasibility of kriging analysis depends on data quality and quantity. The quality of data is referred to as the adequacy of the data spreading so that for assumed spatial prediction task. The quantity means whether the sample size is large enough. Today, we often face the circumstances where a set of data is collected already, although from the viewpoint of kriging analysis the data is insufficient, but re-sampling is impossible because of the cost and time limits. Therefore, a solution must be found. In this paper, we propose a mixed approach by combining grey differential equation models, particularly, GM(1,1) model and ordinary kriging approach together and called GM(1,1)-kriging. We will expand the existing limited sample data available to produce a GM(1,1)-kriging map. The new approach addresses ill-designed spatial data and provides a better spatial analysis results. This approach is illustrated using a small sample of soil dioxin collected from Midland County, Michigan State, U.S.A.