Review of: "Spatial Analysis of Soil Fertility Using Geostatistical Techniques And Artificial Neural Networks"

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Potential competing interests: No potential competing interests to declare.

The paper aims to offer a spatial visualization of soil fertility categories based on 10 field-measured soil variables. The author begins by sampling field data, subsequently employing the ordinary geostatistical kriging method to generate spatially continuous soil data. This data then informs a neural network, which leverages FKCN to classify soil fertility at each location into five categories.

In general, the paper is articulate and introduces a methodology with promising applications in GIS systems. The author adeptly elucidates the two primary methods: ordinary geostatistical kriging and FKCN. The kriging approach is sound based on the provided descriptions and data. The FKCN, recognized for its capacity to navigate nonlinear relationships among the 10 variables and maintain topological associations, is apt for this endeavor.

However, the paper falls short in conclusively determining the optimal number of classes from the presented data, potentially restricting the method's broad applicability. While employing discriminant analysis to cross-validate the FKCN is commendable, the resulting accuracy is not particularly striking. An external validation using data not involved in the modeling process, alongside the current discriminant analysis, would bolster confidence in the FKCN's reliability and precision. Moreover, grounding the findings in soil science, emphasizing real-world fertility attributes, would enrich the model's interpretability.

Minor points of contention include:

- In the "Interpolation of soil properties" section, the author correctly aligns with established practices concerning the use of kriging models and their evaluation. However, there's an inconsistency where the text cites "SSE reflects the model's deviation," but no mention of SSE (presumably the Sum of Squared Errors) appears among the six previously listed metrics. This discrepancy might be an oversight or typographical error.
- In Table 3's index column, the term "RMSE" should be corrected to "RMSS."
- To enhance clarity, the subheading "Assessing the reliability of prediction models" could be more aptly titled "Assessing the reliability of kriging models," especially given the paper's use of two distinct prediction models.