

Visualization Strategies for handling Uncertainty in SVC models: Implications for Reproducibility and Replicability

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ABSTRACT:

This study aims to investigate the issues of reproducibility and replicability through the lens of multiscale local models, also known as spatially varying coefficient (SVC) models. Examples of such models include multiscale geographically weighted regression, Bayesian spatially varying coefficient models, random effect eigenvector spatial filtering, and others. These models facilitate replication by allowing hypotheses to be tested across an arbitrary number of locations in a study area. Despite this, there is relatively little attention paid towards how to most effectively visualize the uncertainties associated with large amounts of model outputs and to assess replicability within a given model or across different models using the same or similar data. In addition, the growing number of model specifications and tunable model parameters makes it increasingly challenging to ensure the reproducibility of any particular SVC modeling application. Therefore, in addition to discussing these issues of reproducibility and replicability in this context, we develop a series of visualization strategies and reporting best practices, along with a demonstrative application using different types of multiscale SVC models, in order to enhance the collective reliability and transparency of these models for accumulating evidence.

KEYWORDS: *multiscale local modeling, visualization, uncertainty, replicability*

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