Bayesian Hierarchical Model for Yield Improvement Monitoring in Kenya's Regional Networks Systems

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Abstract

This study focuses on improving yield monitoring in Kenya's agricultural regions through a Bayesian hierarchical model, addressing gaps in current regional network systems for climate and crop data. A Bayesian hierarchical model was developed, incorporating data from multiple regions across Kenya. The model accounts for spatial correlation and heterogeneity among regions, providing more accurate yield predictions with uncertainty quantification through credible intervals. The analysis revealed significant spatial variation in yield improvements, with some regions showing a 15-20% increase compared to baseline levels, indicating the effectiveness of the hierarchical approach in capturing regional differences. This Bayesian hierarchical model offers a more nuanced understanding of yield improvement trends across Kenya's agricultural regions. The findings suggest that targeted interventions and policy adjustments can be informed by this methodology. Future research should validate these results with additional data sources and explore the impacts of climate change on regional yields using similar modelling techniques. The empirical specification follows $Y = \vec{\beta}_{0+\beta} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Kenyan, Bayesian, Hierarchical, Monitoring, Networks, Methodology, Climate, Yield*

ABSTRACT-ONLY PUBLICATION

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