African Retailing Studies

Machine Learning Models for Climate Prediction and Adaptation in Ghana 2009

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Abstract

Climate change poses significant challenges to agricultural productivity in Ghana, particularly affecting smallholder farmers who rely on climate-sensitive crops and practices. Machine learning algorithms including Random Forest and Gradient Boosting were trained on a dataset of meteorological records spanning to assess their predictive accuracy and reliability. The Random Forest model demonstrated an average prediction error rate of ±5% for rainfall, with a 95% confidence interval indicating the range within which we can be 95% confident that the true mean lies. Both models showed promise in climate prediction but were sensitive to input data quality and required further validation through real-world applications. Further research should focus on integrating more diverse datasets, including socio-economic factors, to enhance model performance and applicability in Ghana's context. Machine Learning, Climate Prediction, Random Forest, Gradient Boosting, Ghana Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *Geographical Information Systems, Geographic Information Systems, Machine Learning, Predictive Analytics, Climate Modelling, Data Mining, Spatial Analysis*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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