



Machine Learning Models for Climate Prediction and Adaptation in Ghanaian Context

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Abstract

Climate change poses significant challenges to Ghana's agricultural sector and infrastructure resilience. Accurate climate predictions are crucial for effective adaptation strategies. The study employed a hybrid ensemble model combining Random Forest and Support Vector Machines (SVM) to predict future climate conditions. Model parameters were calibrated using cross-validation techniques. The ensemble model demonstrated an R² score of 0.85, indicating substantial explanatory power in predicting temperature anomalies over the validation period. This study validates the utility of machine learning models for enhancing Ghana's climate adaptation planning by improving predictive accuracy. Implementing these models could lead to more effective resource allocation and policy development for climate resilience efforts. Machine Learning, Climate Prediction, Ensemble Models, Ghana Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sum}_{iell}(y_i, f\theta(\xi)) + \lambda lVert\theta rVert^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, Geospatial Analysis, Ensemble Forecasting, Feature Selection, Bayesian Networks, Climate Indices, Predictive Modelling*

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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