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Machine Learning Models for Climate Prediction and Adaptation in Sierra Leone

Salimatu Kamara[1]

[1] Department of Artificial Intelligence, Fourah Bay College, University of Sierra Leone

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Correspondence: skamara@outlook.com

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Author notes

Salimatu Kamara is affiliated with Department of Artificial Intelligence, Fourah Bay College, University of Sierra Leone and focuses on Computer Science research in Africa.

Abstract

Climate change poses significant challenges to Sierra Leone's agricultural productivity and water resources management. The country lacks comprehensive climate data and sophisticated prediction models. We employed a Random Forest algorithm to model future climate scenarios. Data was sourced from the National Meteorological Service of Sierra Leone and validated using cross-validation techniques. The ML models demonstrated a predictive accuracy of 82% in simulating temperature trends, with an uncertainty interval indicating ±5% variability. Our machine learning models provide reliable climate predictions for Sierra Leone, aiding in more effective adaptation strategies and resource management. Public sector entities should integrate these ML models into their planning processes to enhance resilience against climate-induced risks. Machine Learning, Climate Prediction, Adaptation Planning, Sierra Leone 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: *Sub-Saharan, Machine Learning, Ensemble Forecasting, Climate Indices, Data Fusion, Predictive Analytics, Geospatial 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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