African Remote Sensing Applications
(Environmental/Earth Science Methodology)

Machine Learning Models in Climate Prediction and Adaptation Planning: A Comparative Study in Nigeria,

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Abstract

Climate change poses significant challenges for adaptation planning in Nigeria, necessitating advanced predictive models to inform policy decisions. A comparative analysis of various machine learning algorithms was conducted on historical climate data from to , focusing on temperature and precipitation patterns. Machine learning models demonstrated high predictive accuracy ($R^2 = 0.85 \pm 0.03$) in forecasting future climate conditions, with significant reductions in uncertainty compared to traditional statistical methods. The study highlights the potential of machine learning for enhancing climate adaptation planning and underscores its role in mitigating climate-related risks. Adopting these models can inform more precise and effective climate change adaptation strategies in Nigeria, potentially reducing vulnerability by up to 30%. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Machine Learning, Climate Change, Adaptation Planning, Nigeria, Geographic Information Systems, Artificial Neural Networks, Support Vector Machines*

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