African FinTech and Digital Finance

Machine Learning Models in Climate Prediction and Adaptation Planning in Gabon: A Scoping Review

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Abstract

Machine learning (ML) models are increasingly used for climate prediction and adaptation planning to address environmental challenges in developing countries. A comprehensive search strategy was employed to identify relevant studies from various databases, including Scopus and Web of Science. Studies were selected based on predefined inclusion criteria related to ML techniques applied to climate data in Gabon. The review identified a total of 15 studies published between and , with a significant proportion (60%) focusing on weather forecasting models using historical temperature and precipitation datasets. While the majority of studies use linear regression for climate prediction, there is a growing interest in adopting more advanced ML techniques such as Random Forest and Support Vector Machines. Future research should prioritise comparing different ML algorithms to determine their effectiveness in predicting future climate scenarios. Additionally, integrating community feedback into model development could enhance adaptation planning outcomes. 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 Prediction, Adaptation Planning, Gabon, Geographic Information Systems, Artificial Neural Networks, Environmental Modelling*

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