African Visual Communication Studies (Media/Arts)

Machine Learning Models in Climate Prediction and Adaptation Planning in the Republic of Congo: A Systematic Review

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Abstract

Climate change poses significant challenges to the Republic of Congo's sustainable development, necessitating advanced forecasting models for early warning and adaptation planning. A systematic literature search was conducted using databases such as Scopus and Web of Science. The inclusion criteria were studies published between and that utilised machine learning models for climate prediction or adaptation planning in the Republic of Congo. Machine learning models, particularly deep neural networks (DNN), showed an accuracy rate of over 85% in predicting temperature changes compared to traditional statistical methods. The proportion of studies using DNN was significantly higher than those employing other machine learning techniques. The findings suggest that machine learning models are effective tools for enhancing climate prediction and adaptation planning, with deep neural networks being the most reliable method. Future research should focus on integrating machine learning models into existing climate change adaptation strategies to improve their practical utility in the Republic of Congo. 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, Forecasting, Geospatial Analysis, Geographic Information Systems, Modelling, Adaptation Planning*

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