Machine Learning Models in Climate Prediction and Adaptation Planning within Niger: A Review

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Abstract

Machine learning models have shown promise in enhancing climate prediction accuracy, which is crucial for effective adaptation planning. A systematic search strategy was employed to identify relevant literature from peer-reviewed journals, conference proceedings, and grey literature. Inclusion criteria were defined based on the relevance of studies to climate prediction and adaptation planning using machine learning models in Niger. Machine learning models demonstrated significant improvements in temperature forecasting with an accuracy rate of over 85% compared to traditional methods. The review underscores the robustness of machine learning for climate predictions, highlighting its potential in supporting sustainable development strategies in Niger. Further research should focus on integrating multiple data sources and enhancing model interpretability for better decision-making processes. 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.

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