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Machine Learning Models for Climate Prediction and Adaptation in Tanzanian Environments

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Abstract

Climate prediction models are crucial for understanding and adapting to environmental changes in Tanzania's diverse ecosystems. The study employed a comparative analysis of various machine learning algorithms including Random Forest and Support Vector Machines (SVM), with a focus on optimising model performance using grid search cross-validation. The dataset comprised historical weather data from multiple sites across Tanzania. Random Forest models achieved an accuracy rate of 82% in predicting temperature changes, showing strong predictive power compared to SVM with a precision rate of 75%. The study validated the effectiveness of machine learning techniques for climate prediction and adaptation planning in Tanzanian contexts. Future research should expand model validation across different regions and integrate socio-economic factors into the models to enhance their applicability. Machine Learning, Climate Prediction, Adaptation Planning, Tanzania 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: *Tanzania, Machine Learning, Climate Prediction, Data Mining, Geographic Information Systems, Algorithm Evaluation, Predictive Analytics*

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