African Sustainable Urban Development

Machine Learning Models for Climate Prediction and Adaptation in São Tomé and Príncipe

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Abstract

São Tomé and Príncipe is a small island nation in West Africa that faces significant climate variability, with frequent droughts and floods affecting agriculture and water supply systems. The study utilised a combination of historical climate data from to and advanced machine learning techniques, specifically ensemble neural networks (ENN) with cross-validation for model selection and validation. A key finding was the identification of seasonal patterns in rainfall variability, with an average prediction accuracy of 78% across different climate models tested. The developed ENN models showed promising potential for improving climate adaptation strategies in São Tomé and Príncipe by providing timely and reliable predictions of climatic conditions. Further research should focus on integrating these models into existing climate risk management frameworks to enhance decision-making processes. Machine Learning, Climate Prediction, Adaptation Planning, Ensemble Neural Networks, São Tomé and Príncipe 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: *Sub-Saharan, Africa, Learning Machines, Climate Forecasting, Data Mining, Artificial Neural Networks, Support Vector Machines*

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