African Silviculture (Forestry)

Time-Series Forecasting Model for Evaluating System Reliability at Field Research Stations in Uganda

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Abstract

Field research stations in Uganda are essential for monitoring agricultural productivity and environmental changes over time. The reliability of these systems is crucial for accurate data collection and analysis. A time-series forecasting model was developed and applied to historical data from Uganda's agricultural research stations. The model incorporates ARIMA (Autoregressive Integrated Moving Average) for predicting future trends based on past performance. The analysis revealed a significant improvement in system reliability, with an estimated 85% reduction in forecast errors over the last year compared to previous methods. This study demonstrates that time-series forecasting can effectively enhance the reliability of field research station systems in Uganda. The model's robustness and predictive accuracy provide valuable insights for future agricultural monitoring. Field researchers should consider implementing this model for ongoing data collection, which could lead to more accurate long-term trend analyses and better-informed policy decisions. Agricultural research, Field stations, Time-series forecasting, Reliability, ARIMA The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, time-series analysis, system reliability, forecasting models, agricultural productivity, environmental monitoring, stochastic processes*

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