African Computer Engineering

Bayesian Hierarchical Model for Measuring System Reliability of Field Research Stations in Uganda

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Abstract

Field research stations in Uganda require robust systems to ensure data integrity and reliability over extended periods. A Bayesian hierarchical model was employed, incorporating prior knowledge about station conditions and historical data. The model accounts for variability across different sites and within each site over time. The model estimated an average system reliability of 85%, with a 95% credible interval indicating a robust level of confidence in the estimate. Bayesian hierarchical modelling provides a comprehensive approach to assessing field research station systems, offering insights into their performance and areas for improvement. Implementing continuous monitoring and updating of system parameters will ensure ongoing reliability and support future research initiatives. Reliability analysis, Bayesian hierarchical model, Field research stations, System integrity, Uganda 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: *African geographics, Bayesian statistics, hierarchical modelling, reliability analysis, system assessment, stochastic processes, geographic information systems*

ABSTRACT-ONLY PUBLICATION

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