African Probability and Statistics (Pure Science)

Finite-Element Discretization and Error Bounds in Numerical Optimization for Telecom Network Reliability in Ghana

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Abstract

This study addresses a current research gap in Mathematics concerning Numerical Optimization for telecom network reliability in Ghana: finite-element discretization and error bounds in Ghana. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A theorem-driven mathematical framework was developed under explicit regularity assumptions, with stability and convergence analysis of the proposed estimator. The main results show stability of the proposed functional under bounded perturbations and convergence of the estimator to a well-defined limit, characterised by $R(x) = argmin_{\theta} L(\theta; x)$. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Numerical Optimization for telecom network reliability in Ghana: finite-element discretization and error bounds, Ghana, Africa, Mathematics, theoretical This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims.

Keywords: *Sub-Saharan, Optimization, Finite-Element, Error-Bounds, Numerical-Methods, Grid-Partitioning, Network-Simulation*

ABSTRACT-ONLY PUBLICATION

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