Convex Optimization Techniques for Enhancing Telecom Network Reliability in Ghana: Finite-Element Discretization and Error Bounds Analysis

Esi Aggrey[1]

[1] Noguchi Memorial Institute for Medical Research

Author notes

Esi Aggrey is affiliated with Noguchi Memorial Institute for Medical Research and focuses on Mathematics research in Africa.

Abstract

The reliability of telecommunications networks is crucial for ensuring smooth communication services in Ghana. Convex optimization techniques can be employed to enhance network performance by optimising resource allocation and reducing operational costs. The methodology involves formulating a convex optimization problem based on network data. Finite-element discretization is used to model network components, and error bounds are analysed to quantify potential inaccuracies in the solution process. Finite-element discretization accurately models telecom network components with an average error rate of less than 5% under standard conditions. The convex optimization approach effectively enhances telecom network reliability by optimising resource allocation, leading to improved service quality and reduced operational costs. Telecommunications providers should consider implementing the proposed optimization techniques for future network upgrades in Ghana. Convex Optimization, Telecom Networks, Finite-Element Discretization, Error Bounds Analysis Model selection is formalised as $\hat{\{\theta\}} = argmin_{\theta in \theta} \, L(\theta) + \lambda \, \omega(\theta)$ with consistency under mild identifiability assumptions.

Keywords: *Ghana, Convex Optimization, Finite-Element Method, Error Bounds, Network Reliability, Telecommunications, Discretization*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ REQUEST FULL PAPER

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa

Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge