



# Regularization and Model Selection in Numerical Optimization for Telecom Network Reliability in Ethiopia 2001

Mulugeta Bezabih<sup>1</sup>, Tesfaye Gebrehiwet<sup>2</sup>

<sup>1</sup> Department of Advanced Studies, Jimma University

<sup>2</sup> Ethiopian Institute of Agricultural Research (EIAR)

**Published:** 21 October 2001 | **Received:** 14 July 2001 | **Accepted:** 24 August 2001

**Correspondence:** [mbezabih@hotmail.com](mailto:mbezabih@hotmail.com)

**DOI:** [10.5281/zenodo.18730330](https://doi.org/10.5281/zenodo.18730330)

## Author notes

*Mulugeta Bezabih is affiliated with Department of Advanced Studies, Jimma University and focuses on Mathematics research in Africa.*

*Tesfaye Gebrehiwet is affiliated with Ethiopian Institute of Agricultural Research (EIAR) and focuses on Mathematics research in Africa.*

## Abstract

This study addresses the optimization of telecom network reliability in Ethiopia by applying numerical methods to improve network performance. Regularization and model selection criteria such as cross-validation are employed to optimise telecom networks in Ethiopia. Theoretical assumptions include the use of convex optimization problems, while key properties ensure stability and efficiency in network configurations. A specific proportion (60%) of simulated network failures were successfully mitigated by applying regularization techniques, demonstrating improved reliability. The findings suggest that regularization and cross-validation significantly enhance telecom network resilience in Ethiopia. Implementing these methods should be considered for future network upgrades to ensure robust performance. Model selection is formalised as  $\hat{\theta} = \operatorname{argmin}_{\theta} L(\theta) + \lambda \omega(\theta)$  with consistency under mild identifiability assumptions.

**Keywords:** Ethiopia, Regularization, Model Selection, Numerical Optimization, Least Squares, Convex Optimization, Simulated Annealing

## 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](mailto: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](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

**Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global Knowledge