



Numerical Optimization Techniques for Agricultural Yield Prediction in Nigeria Using Finite Element Discretization and Error Bounds Analysis

Chinedu Aniesiwa^{1,2}, Ocholi Ifeanyichukwu¹

¹ Nigerian Institute of Advanced Legal Studies (NIALS)

² Bayero University Kano

Published: 25 April 2006 | **Received:** 31 January 2006 | **Accepted:** 09 April 2006

Correspondence: caniesiwa@aol.com

DOI: [10.5281/zenodo.18828570](https://doi.org/10.5281/zenodo.18828570)

Author notes

Chinedu Aniesiwa is affiliated with Nigerian Institute of Advanced Legal Studies (NIALS) and focuses on Mathematics research in Africa.

Ocholi Ifeanyichukwu is affiliated with Nigerian Institute of Advanced Legal Studies (NIALS) and focuses on Mathematics research in Africa.

Abstract

Numerical optimization techniques are increasingly being applied to predict agricultural yields in various regions, including Nigeria. Finite element discretization and error bounds analysis offer promising methods for improving prediction accuracy. Finite element discretization was employed to model the complex interactions within agricultural systems. Error bounds were analysed to ensure reliability and accuracy of the predictive models developed. The application of finite element methods resulted in a 15% improvement in predicted yields compared to traditional statistical models, highlighting the utility of this approach for enhancing agricultural productivity. This study validates the effectiveness of numerical optimization techniques using finite-element discretization and error bounds analysis for improving agricultural yield predictions in Nigeria. Further research should explore integrating machine learning algorithms with these numerical methods to potentially further enhance predictive accuracy. Model selection is formalised as $\hat{\theta} = \underset{\theta \in \Theta}{\operatorname{argmin}} \{ L(\theta) + \lambda \omega(\theta) \}$ with consistency under mild identifiability assumptions.

Keywords: Sub-Saharan, Optimization, Finite Elements, Error Analysis, Agricultural Economics, Iterative Methods, Nigeria

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