



Designing an AI-Driven Soil Conditioner Recommendation System for Southern Malawi

Chinaza Simba^{1,2}, Zathua Nkhata³, Kingsley Mpakali^{4,5}

¹ Lilongwe University of Agriculture and Natural Resources (LUANAR)

² Department of Cybersecurity, Mzuzu University

³ Mzuzu University

⁴ Department of Artificial Intelligence, Lilongwe University of Agriculture and Natural Resources (LUANAR)

⁵ Malawi University of Science and Technology (MUST)

Published: 25 February 2009 | Received: 30 October 2008 | Accepted: 25 January 2009

Correspondence: csimba@gmail.com

DOI: [10.5281/zenodo.18898558](https://doi.org/10.5281/zenodo.18898558)

Author notes

Chinaza Simba is affiliated with Lilongwe University of Agriculture and Natural Resources (LUANAR) and focuses on Computer Science research in Africa.

Zathua Nkhata is affiliated with Mzuzu University and focuses on Computer Science research in Africa.

Kingsley Mpakali is affiliated with Department of Artificial Intelligence, Lilongwe University of Agriculture and Natural Resources (LUANAR) and focuses on Computer Science research in Africa.

Abstract

This study addresses a current research gap in Computer Science concerning Designing an Artificial Intelligence-Driven Soil Conditioner Recommendation System for Smallholder Farmers in Southern Malawi in Malawi. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Designing an Artificial Intelligence-Driven Soil Conditioner Recommendation System for Smallholder Farmers in Southern Malawi, Malawi, Africa, Computer Science, methodology paper This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Model estimation used $\hat{\theta} = \operatorname{argmin} \{ \theta \} \operatorname{sumiell} (y_i, f\theta (\xi)) + \lambda \operatorname{Vert} \theta r \operatorname{Vert} 2^2$, with performance evaluated using out-of-sample error.

Keywords: Sub-Saharan, AI, machine learning, k-Nearest Neighbors, feature extraction, fuzzy logic, geospatial analysis

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