



AI in Diagnostic Innovations for Resource-Constrained Healthcare Settings in Malawi

Simbiri Simwingwa^{1,2}, Kasamvu Chikuni³, Mafinga Mankhanga^{4,5}, Chinyika Nkomwa⁶

¹ Department of Software Engineering, Lilongwe University of Agriculture and Natural Resources (LUANAR)

² Mzuzu University

³ Department of Software Engineering, University of Malawi

⁴ University of Malawi

⁵ Department of Cybersecurity, Lilongwe University of Agriculture and Natural Resources (LUANAR)

⁶ Department of Artificial Intelligence, University of Malawi

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Correspondence: ssimwingwa@aol.com

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Author notes

Simbiri Simwingwa is affiliated with Department of Software Engineering, Lilongwe University of Agriculture and Natural Resources (LUANAR) and focuses on Computer Science research in Africa.

Kasamvu Chikuni is affiliated with Department of Software Engineering, University of Malawi and focuses on Computer Science research in Africa.

Mafinga Mankhanga is affiliated with University of Malawi and focuses on Computer Science research in Africa.

Chinyika Nkomwa is affiliated with Department of Artificial Intelligence, University of Malawi and focuses on Computer Science research in Africa.

Abstract

Diagnostic innovations leveraging artificial intelligence (AI) have shown promise in resource-limited healthcare settings, particularly in sub-Saharan Africa where diagnostic capabilities are often constrained by limited infrastructure and trained professionals. The study employed a mixed-methods approach, combining quantitative machine learning techniques with qualitative user experience assessments. A random forest classifier was used for training AI models to diagnose common infectious diseases prevalent in Malawi's healthcare settings. User feedback surveys were conducted to ensure the tools' usability and acceptance by frontline healthcare workers. The preliminary results indicate a classification accuracy rate of 85% for AI models trained on datasets from existing clinics, with an estimated 90% confidence interval around this estimate. This study provides foundational insights into the feasibility and potential benefits of integrating AI diagnostic tools in Malawi's healthcare system. The findings suggest that these tools can significantly enhance disease diagnosis accuracy while increasing efficiency. Further research should focus on validating these models across diverse geographical and socioeconomic settings, as well as exploring ways to integrate them with existing health information systems for broader impact. AI diagnostics, resource-constrained healthcare, machine learning, user experience, Malawi Model estimation used $\hat{\theta} = \operatorname{argmin} \{ \theta \} \sum_{i=1}^n \ell(y_i, f_{\theta}(\xi)) + \lambda \|\theta\|_2^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, AfricanNeuroscience, MachineLearning, Bioinformatics, DataMining, ArtificialIntelligence, Diagnostics*

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