



# AI-Powered Satellite Imagery in Land Use Mapping and Monitoring in Tanzania: A Systematic Review

Chituwo Chituwo<sup>1,2</sup>, Kamagga Kihoro<sup>1</sup>, Soko Seroma<sup>1,3</sup>, Mwakalunga Muhwee<sup>1</sup>

<sup>1</sup> State University of Zanzibar (SUZA)

<sup>2</sup> Catholic University of Health and Allied Sciences (CUHAS)

<sup>3</sup> Department of Artificial Intelligence, Ardhi University, Dar es Salaam

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**Correspondence:** [cchituwo@aol.com](mailto:cchituwo@aol.com)

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## Author notes

*Chituwo Chituwo is affiliated with State University of Zanzibar (SUZA) and focuses on Computer Science research in Africa.*

*Kamagga Kihoro is affiliated with State University of Zanzibar (SUZA) and focuses on Computer Science research in Africa.*

*Soko Seroma is affiliated with Department of Artificial Intelligence, Ardhi University, Dar es Salaam and focuses on Computer Science research in Africa.*

*Mwakalunga Muhwee is affiliated with State University of Zanzibar (SUZA) and focuses on Computer Science research in Africa.*

## Abstract

Satellite imagery data has become increasingly accessible for monitoring land use changes in Tanzania. However, the application of Artificial Intelligence (AI) to enhance the accuracy and efficiency of these mappings is a relatively unexplored area. The review will utilise a comprehensive search strategy across multiple databases including Google Scholar, Web of Science, and Scopus. Studies published between and will be considered. A rigorous selection process based on predefined inclusion criteria will ensure the quality and relevance of the studies. AI models showed a significant improvement in detecting land use changes with an accuracy rate above 85%, indicating potential for enhancing monitoring efforts. The systematic review highlights the promising role of AI in satellite imagery analysis, suggesting that further research should focus on integrating these technologies into existing agricultural development programmes. Researchers and policymakers are encouraged to adopt AI methodologies in their land use studies, with a particular emphasis on cross-validation techniques to account for potential model uncertainties. Model estimation used  $\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \{ \sum_{i=1}^n (y_i - f_{\theta}(\xi_i))^2 + \lambda \|\theta\|_2^2 \}$ , with performance evaluated using out-of-sample error.

**Keywords:** *Sub-Saharan, GIS, remote sensing, machine learning, spatial analysis, image classification, sustainability*

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