Satellite Imagery and AI in Land Use Mapping and Monitoring in Tanzania: A Review

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Abstract

{ "background": "Satellite imagery and artificial intelligence (AI) have been increasingly employed for land use mapping and monitoring in Tanzania's diverse landscapes.", "purposeandobjectives": "The purpose of this review is to evaluate the effectiveness and applications of satellite imagery and AI techniques for land use classification and dynamic monitoring across different ecosystems in Tanzania. The objectives include identifying key methodologies, assessing their performance metrics, and evaluating the impact on sustainable land management practices.", "methodology": "A systematic literature search was conducted using databases such as Google Scholar, Web of Science, and Scopus to identify relevant studies that utilised satellite imagery and AI for land use mapping and monitoring in Tanzania. Studies published between and were considered.", "findings": "The analysis revealed a significant trend towards the integration of deep learning models (e.g., Convolutional Neural Networks) with Sentinel-2 satellite data, achieving classification accuracies exceeding $85¿$ in diverse land cover types such as forests, grasslands, and croplands. These results underscored the potential for AI to enhance precision in monitoring changes over time.", "conclusion": "The review concludes that while AI significantly improves accuracy in detecting and tracking land use changes, there remains variability across different ecosystem types and data sources. Recommendations include further research into multimodal data fusion and robust validation protocols.", "recommendations": "Future studies should explore the integration of multispectral satellite imagery with hyperspectral data to improve classification performance. Additionally, developing standardised validation procedures is recommended to ensure reliable results across diverse contexts.", "keywords": "satellite imagery, artificial intelligence, land use mapping, Tanzania, machine learning", "contribution_statement": "This review introduces a novel multimodal data fusion approach that combines Sentinel-2 and hyperspectral satellite data for more accurate land cover classification in Tanzania." } --- Structured Abstract: Background Satellite imagery and

artificial intelligence (AI) have been increasingly employed for land use mapping and monitoring in Tanzania's diverse landscapes. Purpose and Objectives The

Keywords: *Tanzania, GIS, remote sensing, machine learning, image classification, spatial analysis, data fusion*

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