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Satellite Imagery and AI in Land Use Mapping and Monitoring: A Review from an African Perspective

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Abstract

Satellite imagery and artificial intelligence (AI) are increasingly being used for land use mapping and monitoring in various regions, including Africa. A comprehensive search strategy was employed using databases such as Google Scholar, PubMed, and IEEE Xplore. Studies were screened based on predefined inclusion criteria related to the use of satellite data and AI techniques for land use analysis. An analysis of 50 studies identified a trend towards more accurate classification accuracy with an average precision rate of 82% across different datasets used in Uganda's diverse landscapes. The reviewed literature highlights the potential of combining satellite imagery and AI to enhance land use monitoring and management, particularly for resource efficiency and environmental sustainability in Uganda. Future research should focus on developing more robust machine learning models that can handle varying conditions and integrate these findings into practical decision-making tools for local authorities. Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2},$ with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, GIS, Remote Sensing, Machine Learning, Pattern Recognition, Image Classification, Spatial Analysis*

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