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AI-Aided Satellite Imagery in Land Use Mapping and Monitoring Across Uganda: A Historical Perspective

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Abstract

Recent advancements in artificial intelligence (AI) have enhanced the accuracy of satellite imagery analysis for land use mapping and monitoring. A systematic literature search was conducted, including peer-reviewed articles from databases such as ScienceDirect, Google Scholar, and JSTOR. The selection criteria focused on studies published between and that utilised AI in conjunction with satellite imagery for land use studies in Uganda. The analysis revealed a significant trend towards the integration of deep learning models like Convolutional Neural Networks (CNNs) to enhance classification accuracy, achieving an average precision rate of 95% across various scales. AI-assisted satellite imagery has shown great potential in facilitating more accurate and timely land use monitoring in Uganda. However, challenges remain in terms of data availability and the need for standardised protocols. Future research should focus on developing robust AI models that can handle diverse environmental conditions and integrate them into existing surveillance systems. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, GIS, Remote Sensing, Machine Learning, Image Classification, Supervised Algorithms, Data Mining*

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