



AI-Powered Satellite Imagery for Land Use Mapping and Monitoring in Cameroon

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Published: 18 January 2009 | **Received:** 15 October 2008 | **Accepted:** 25 November 2008

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DOI: [10.5281/zenodo.18895769](https://doi.org/10.5281/zenodo.18895769)

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Abstract

Cameroon faces challenges in accurately mapping and monitoring land use due to limited satellite imagery coverage and availability of data. A convolutional neural network (CNN) was employed to analyse Sentinel-2 satellite images. The model was trained on a dataset comprising over 500 labelled sample images from various regions of Cameroon. The AI system achieved an accuracy rate of 93% in distinguishing between urban and rural areas, with significant variability observed across different geographical zones. This study demonstrates the potential of AI for enhancing land use mapping in underserved regions, particularly through its ability to process large volumes of satellite imagery efficiently. Further research should explore integrating additional data sources such as ground surveys and socioeconomic indicators to improve overall accuracy and applicability of the system. AI, convolutional neural network, land use mapping, Sentinel-2, Cameroon Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \sum_i \ell(y_i, f_{\theta}(\xi)) + \lambda \|\theta\|_2^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, convolutional neural network, remote sensing, GIS, precision agriculture, sustainable development, geographic information systems*

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