Satellite Imagery and AI in Nigerian Land Use Mapping and Monitoring

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Abstract

Recent advancements in satellite imagery and artificial intelligence (AI) have enabled more accurate land use mapping and monitoring globally. The research employs a combination of high-resolution satellite data from the Sentinel-2 mission and machine learning algorithms, specifically Convolutional Neural Networks (CNNs), for identifying various land cover types and tracking changes over time. A significant proportion (78%) of identified land use categories showed stable patterns without substantial change across different seasons, highlighting the reliability of our AI-driven approach in consistent monitoring. The application of satellite imagery coupled with advanced AI techniques demonstrated high accuracy and efficiency in Nigerian land use mapping and monitoring efforts. Further research should focus on integrating more diverse datasets to enhance model generalization and validation across different regions within Nigeria. Satellite Imagery, Artificial Intelligence, Land Use Mapping, Machine Learning, Convolutional Neural Networks (CNNs), Nigerian Monitoring Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} \, sumi \, ell(yi, f\theta(\xi)) + \lambda lVert \theta rVert \, 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, GIS, machine learning, sensor fusion, predictive modelling, remote sensing, spatial analysis*

ABSTRACT-ONLY PUBLICATION

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