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Satellite Imagery and AI in Land Use Mapping and Monitoring in Chad: A Data Descriptor

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Abstract

Land use mapping in Chad utilizes satellite imagery to monitor changes in vegetation cover, soil types, and land management practices. The methodology involves preprocessing the Sentinel-2 images through cloud masking and radiometric calibration. An AI model (Random Forest) was trained on a labelled dataset of known land cover types. An accuracy rate of 87% for classifying different land use types, with mixed forests showing higher variability in classification compared to other land cover types. The developed system demonstrates potential for automated and consistent monitoring of land use changes in Chad's varied landscapes. Further validation using field data is recommended to improve model generalization across different environmental conditions. Sentinel-2, AI, Random Forest, Land Use Mapping, Chad 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: *Sudanic, Sentinel-2, GIS, machine learning, remote sensing*

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