African Digital Media Studies (Media/Social focus)

AI-Powered Satellite Imagery for Land Use Mapping and Monitoring in Ethiopia: A Methodological Approach

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Abstract

Land use mapping in Ethiopia has been challenged by limited data availability and high costs associated with traditional field surveys. The methodology involves preprocessing satellite images through deep learning techniques to enhance image quality, followed by supervised machine learning classification of land cover types. A convolutional neural network (CNN) model is employed with a validation set size of 30% for assessing model performance. A significant proportion, 85%, of the test data achieved an accuracy rate above 90% in identifying different land use categories using the CNN model. The methodological approach demonstrates high potential for cost-effective and accurate land use mapping and monitoring across Ethiopia. Future research should explore integrating additional satellite bands to improve classification accuracy. 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, MachineLearning, RemoteSensing, ImageProcessing, SpatialAnalysis, SustainableDevelopment*

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