Object-Based: Land Use Land Cover Classification and House Detection from Drone Imagery Using Random Forest

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SUMMARY

A drone, also commonly known as a remotely piloted aircraft system, which is widely used for capturing essential information along with geotagged images to determine the three-dimensional position of a location. The scope of drone surveying is broad, with diverse applications like agriculture, geospatial surveys, military operations, and others. High-resolution spatial drone products such as Digital Elevation Models (DEMs), Digital Surface Models (DSMs), Digital Terrain Models (DTMs), and orthophotos are important for analysis and investigation. In the modern era, the integration of drone surveys with AI and Machine Learning has brought significant technological advancements. This study demonstrates the application of drone surveying for house detection and Land Use Land Cover (LULC) classification using machine learning techniques, studied in the area of Anbu Khaireni rural municipality of Tanahun District, Nepal. The Random Forest algorithm with suitable parameters like n_estimator as 100, random_state as 45 and so on was used to detect buildings and classify the land into four classes: forest, cropland, bare land, and built-up area. The digital products were processed using the software like Agisoft Metashape and ArcMap. The paper depicts the application of UAV-based remote sensing combined with AI/ML for accurate object detection and thematic mapping. Despite the limited availability of ground control points (GCPs) and sample points for testing the algorithm, the study highlights the strong recommendations for future improvements through enhanced ground control and statistical validation for the capability of drone technology in terrain mapping and feature extraction.

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