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Lacunarity Analysis of Agricultural Land Cover Image in Northeastern Tanzania

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This study examines land cover/use patterns employing lacunarity analysis as developed in fractal geometry, illuminating their scale (spatial resolution) properties and investigating its applicability to extraction of landscape elements and identification of their size. Lacunarity is an index that is used to quantify homogeneity and texture properties of an image, showing the extent to which the spatial pattern of an image deviates from translational invariance at different scales. In geography and related research fields, lacunarity of various spatial patterns has been analyzed, including drainage systems, soil erosion, tropical forest, urban vegetation and so forth. While a research focus in land cover/use classification is on the improvement in classification accuracy when taking lacunarity into account, there is also room for applying the lacunarity method to investigation on the scale property of an image and the size of its landscape components. Viewing from the latter angle, the study evaluates the capability of total and local lacunarity analyses in the study of agricultural landscape, and of resource distribution patterns in general, applying them to satellite images of agricultural land cover taken in Northeastern Tanzania. It in particular examines the process of land subdivision that is behind the present agricultural landscape in the frontier settlement zone of the mountainous areas in Arusha Region.

Keywords: Local lacunarity, Spatial scale, Agricultural landscape, Tanzania