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Automatic Geological Lineaments Extraction from Digital Elevation Model of Airborne LiDAR

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The analysis of earth's surface linear structures, termed "lineaments" in satellite and aerial photo images, provides important fundamental information in the research of geosciences. To extract the linear from image has been a manual task in the past, this study describes an automatic linear-feature extraction algorithm aim for extraction and also analyzing geological lineaments from airborne LiDAR derived digital elevation model (DEM). LiDAR capable of seeing through vegetation cover then produce high resolution and accuracy DEM that reflected the realistic physiographic in the forested area. Geological lineaments include ridges, folds and faults usually hold a multi-scale characteristics, in order to extract large-scale features, a wavelet transform, based on an orthogonal basis function is adopted to scale down the DEM. Every multi-scale images of one group includes the high pass coefficient image of orthogonal in the basis of three, vertical, horizontal and diagonal directions. Use the high pass image to acquire feature image. The variation edge detector is applied to the resultant image for edge enhancement and detection. The basic operations of mathematical morphology such as dilation, erosion, thinning, and cluster standard deviation are used in removing background noise. We propose a chain-code technique to find the position of end-points and intersections in thinned curves that produced from previous procedures, and also fill the closed contours in finishing linear extraction. Statistics of these finding lines are used to draw the diagram of lineament trend. Several comparisons has been make to the manual pickup outcomes, the higher efficiency and also in depth extraction capability reveals that this technique could release the best benefit from high penetration DEM data from airborne LiDAR.