



Automatic gully-detection from high resolution digital elevation model gathered by LiDAR

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The study will explore the gully automatically from digital elevation model (DEM) by using 2-dimensions Haar Wavelet transform and Canny edge detection algorithm. Detect the gully is a critical issue for prediction of landslide. The main reasons caused the growth of the gully enthusiastically in Taiwan are the rainy climate and the frequent earthquakes. This study provides a rapid, accurate, convenient and objective method to discover the distribution of gully. Because of the well performance for discontinuous wavelet to enhance edges from images, thence this study applied the concept to DEM. First, using a 1-level decomposition of Haar Discrete Wavelet Transform (DWT) to decompose DEM. We can obtained the approximation part (cA), X-direction detailed part (cV), Y-direction detailed part (cH) and XY-direction detailed part (cD) as the results. Using cV and cH to enhance the vertical and horizontal structural-lines information, respectively; Second, extracting the linear characteristics of cV and cH by Canny algorithm and combining the vertical and horizontal structural-lines into a single file which including ridge, valley and cliff structures. Third, removing the ridge and cliff parts from the file because of the gully only exist in valley structure. The last step is to extract the gully from valley structures by the definition of gully shape and remove the noises. The results will calculate the success ratio and compare the efficiency and accuracy of all algorithms.