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Semiautomatic recognition of a rotational landslide geomorphometry from high resolution DEMs

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High resolution DEMs allow the recognition of a range of landforms induced by various geomorphic processes. Landslides produce morphologies which are easily recognizable and delineable on high resolution DEMs and aerial imagery, although the morphology might be smoothed by erosion.
We have analyzed a typical rotational slide and using geomorphometric techniques we have derived a methodology for a semi-automatically delineation of landslide elements and the computation of their metrics. The Cruden and Varnes landslide elements were targeted for the delineation. The user needs to input the landslide boundaries and the toe of the surface of rupture, the procedure estimating the original ground surface and identifying the main and minor scarps, the top, the head, the main body, the foot, the tip, the toe, the flanks, the surface of separation, the displaced material, the zone of depletion, the zone of accumulation, the depleted volume, the depleted mass volume and the accumulation volume.
The methods used for the present approach are: a geomorphometric landform classification (Schmidt and Hewitt fuzzy classification based on slope and curvatures) and a support vector machine applied on the geomorphometric objects obtained with the classification.
Our approach is usable mainly for fresh landslide morphologies, smoothed relict landslides being prone to errors. Errors can be introduced also by DEM artefacts and inaccuracies. The accuracy of the method was validated by manual inspection of the results and was found to be good enough to be used in landslide morphometry.