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# Automated detection of landslides with a hierarchical multi-resolution image analysis approach

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The mapping of landslides from Very High Resolution (VHR) satellite optical images present several challenges related to the heterogeneity of landslide sizes, shapes and ground surface properties. However, a common geomorphological characteristic of landslides is to be organized with a series of embedded and scaled features. These properties motivated the use of a multiresolution image analysis approach based on a hybrid segmentation/classification region-based method. The method, which uses satellite optical images of the same area at various spatial resolutions (Medium to Very High Resolution), relies on a top-down hierarchical framework. In the specific context of landslide analysis, two main novelties are introduced to enrich this framework. The first novelty consists of using non-spectral information, obtained from Digital Surface Model (DSM), as a priori knowledge for the guidance of the segmentation/classification process. The second novelty consists of using a new domain adaptation strategy, that allows to reduce the expert's interaction when handling large image datasets. Experiments performed on satellite images acquired over terrains affected by landslides in ther French Alps demonstrate the efficiency of the proposed method with different hierarchical levels of detail addressing various operational needs.