



Identification of flow type shallow landslide source based on topo-hydro indices considering extreme rainfall and Deep Neural Network

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Flow type shallow landslides constitute one of the most dangerous gravity-induced surface processes. Prediction of source area over a large terrain is considered a preliminary step for the planning or design of the most appropriate risk mitigation measures. The main propose of this research is to identify most likely flow type shallow landslide initiation areas and delineate probable hazard zone in Busan, South Korea. This research introduces a new approach for determining the source areas from potential instability mapped over a terrain stability model. The infinite slope stability model was used considering extreme rainfall. Then, Deep Neural Network (DNN) model was used to integrate topo-hydro indices like slope, internal relief, curvatures, upslope contributing area, and topographic wetness index to find landslide initiation areas. The present method identifies the grid cell with the lowest factor of safety on each downslope path from ridge to valley. Using experimental rheological data, the debris flow runout was simulated to identify runout affected areas. The overlay analysis showed that about 91% of flow type shallow landslides were correctly identified. The proposed method is efficient to apply to identify the debris flow initiation.