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An unconventional GIS-based method to assess landslide susceptibility using point data features

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In this work are reported the results of a project performed by the students attending the course "GIS techniques in Applied Geology", in the master level of the Geological Sciences degree from the Department of Geosciences, University of Padua. The project concerns the evaluation of landslide susceptibility in the Val d'Agno basin, located in the North-Eastern Italian Alps and included in the Vicenza Province (Veneto Region, NE Italy).
As well known, most of the models proposed to assess landslide susceptibility are based on the availability of spatial information on landslides and related predisposing environmental factors. Landslides and related factors are spatially combined in GIS systems to weight the influence of each predisposing factor and produce landslide susceptibility maps. The first and most important input factor is the layer landslide, which has to contain as minimum information shape and type of landslides, so it must be a polygon feature.
In Italy, as well as in many countries all around the world, location and type of landslides are available in the main spatial databases (AVI project and IFFI project), but in few cases mass movements are delimited, thus they are spatially represented by point features. As an example, in the Vicenza Province, the IFFI database contains 1692 landslides stored in a point feature, but only 383 were delimited and stored in a polygon feature. In order to provide a method that allows to use all the information available and make an effective spatial prediction also in areas where mass movements are mainly stored in point features, punctual data representing landslide in the Val d'Agno basin have been buffered obtaining polygon features, which have been combined with morphometric (elevation, slope, aspect and curvature) and non-morphometric (land use, distance of roads and distance of river) factors. Two buffers have been created: the first has a radius of 10 meters, the minimum required for the analysis, and the second has a radius of 70 meters to obtain an area corresponding to the median value of landslide size distribution in the study area.
The Val d'Agno basin has been chosen because the shape of a sufficient number of landslide is available, 169 over 451 phenomena stored in the IFFI point feature. A susceptibility analysis has been performed using the 169 shaped landslides and compared with the results coming from the analyses performed using buffered landslide point features.
Finally, the prediction made using the different methods has been tested comparing the results with the landslides occurred in November 2010 due to an exceptional rainfall event that hit the study area triggering 128 instability phenomena.