Landslide hazard assessment in the "Sassi di Matera" (Southern Italy) using artificial neural network

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This work deals with the evaluation landslide susceptibility and mapping of areas located in the Archaelogical Historical and Natural Park of the Rupestrian Churces in Matera and in the old city of Matera called "Sassi di Matera". This park and the old city of Matera are since 1993 UNESCO World Heritage. The neighbouring areas of the last named are characterized by the presence of the remains of old rupestral civilization. The studied sites are located along the top of an deep canyon (locally called "Gravina di Matera" and deeper than 100 m). The canyon cuts weak rocks (Plio-Pleistocene calcarenites, in which churches and sanctuaries are excavated) and the underlying well-stratified limestones (Cretaceous calcilutites). Both rocks are strongly fractured and disjointed by several different joint sets. Because of its lithological, structural and geomorphological features, this area is affected by a widespread and often active slope instability which lead to large and rapid falls, toppling and sliding of rock blocks. Such geomorphological fragility causes serious and wide processes of structural instability to the rupestrian heritages still present. The landslide susceptibility was assessed by an innovative technique based on the artificial intelligence method: the Artificial Neural Network. This methodology allows to draw maps of susceptibility of the study area starting from thematic maps representing the parameters responsible of the slope instability and that parameterize the territory. The landslide susceptibility assessment needs several input parameters. These are: lithology, elevation, angle and aspect of the slope, fracture density, relief, toposhape and kinematic hazard index of planar and wedge sliding and toppling. The main results of this study will be reported and discussed.