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Harvesting rockfall hazard evaluation parameters from Google Earth Street View

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Rockfall incidents along highways and railways prove extremely dangerous for properties, infrastructures and human lives. Several qualitative metrics such as the Rockfall Hazard Rating System (RHRS) and the Colorado Rockfall Hazard Rating System (CRHRS) have been established to estimate rockfall potential and provide risk maps in order to control and monitor rockfall incidents. The implementation of such metrics for efficient and reliable risk modeling require accurate knowledge of multi-parametric attributes such as the geological, geotechnical, topographic parameters of the study area. The Missouri Rockfall Hazard Rating System (MORH RS) identifies the most potentially problematic areas using digital video logging for the determination of parameters like slope height and angle, face irregularities, etc.

This study aims to harvest in a semi-automated approach geometric and qualitative measures through open source platforms that may provide 3-dimensional views of the areas of interest. More specifically, the Street View platform from Google Maps, is hereby used to provide essential information that can be used towards 3-dimensional reconstruction of slopes along highways. The potential of image capturing along a programmable virtual route to provide the input data for photogrammetric processing is also evaluated. Moreover, qualitative characterization of the geological and geotechnical status, based on the Street View images, is performed. These attributes are then integrated to deliver a GIS-based rockfall hazard map. The 3-dimensional models are compared to actual photogrammetric measures in a rockfall prone area in Crete, Greece while in-situ geotechnical characterization is also used to compare and validate the hazard risk.

This work is considered as the first step towards the exploitation of open source platforms to improve road safety and the development of an operational system where authorized agencies (i.e. civil protection) will be able to acquire near-real time hazard maps based on video images retrieved either by open source platforms, operational unmanned aerial vehicles, and/or simple video recordings from users.

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