



SlidePredict - a platform for near real-time prediction of landslide hazard using weather forecast systems

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Performing landslide hazard assessments requires modelling both the spatial and the temporal dimensions of landslide occurrences. However, most landslide hazard predictions only refer to terrain's susceptibility without including information on the temporal component of the hazard.

Weather forecast platforms provide, in a very simple manner, information about local meteorological conditions at hourly, daily and weekly intervals. The way this information is accessed is either by a phone application or by using a API provided by the platform. By using APIs from various weather forecast platforms, we aimed to build a platform that produces landslide hazard predictions. The system is based on ArcGIS Enterprise developed by Esri and TensorFlow, an open-source software library for machine intelligence developed by Google. Other technologies used in the platform are Python, JavaScript and NodeJS.

The platform we built is using background processes, written in Python, to continuously train the system based on existing landslide data. Landslides hazard is predicted for the next hour and the next day using local predisposing terrain factors and local meteorological conditions provided by the weather forecast platforms. For visualization of the landslides hazard we developed a 2D/3D WebGIS application using ArcGIS JavaScript API available both from desktops and smartphones. Because data provided by each weather forecast system is different, we provide for each prediction an uncertainty estimation and the marginals for the predicted local landslide hazard.

To test the platform, a spatio-temporal landslide database for different study areas located in the Romanian Subcarpathians, was constructed for the last 10 years. Data from the selected study areas covering this very recent time interval were considered sufficient to introduce local meteorological conditions in the existent weather forecast systems.