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Web processing service for landslide hazard assessment

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Hazard analysis requires heavy computation and specialized software. Web processing services can offer complex solutions that can be accessed through a light client (web or desktop). This paper presents a web processing service (both WPS and Esri Geoprocessing Service) for landslides hazard assessment. The web processing service was build with Esri ArcGIS Server solution and Python, developed using ArcPy, GDAL Python and NumPy. A complex model for landslide hazard analysis using both predisposing and triggering factors combined into a Bayesian temporal network with uncertainty propagation was build and published as WPS and Geoprocessing service using ArcGIS Standard Enterprise 10.1. The model uses as predisposing factors the first and second derivatives from DEM, the effective precipitations, runoff, lithology and land use. All these parameters can be served by the client from other WFS services or by uploading and processing the data on the server. The user can select the option of creating the first and second derivatives from the DEM automatically on the server or to upload the data already calculated. One of the main dynamic factors from the landslide analysis model is leaf area index. The LAI offers the advantage of modelling not just the changes from different time periods expressed in years, but also the seasonal changes in land use throughout a year. The LAI index can be derived from various satellite images or downloaded as a product. The upload of such data (time series) is possible using a NetCDF file format. The model is run in a monthly time step and for each time step all the parameters values, a-priory, conditional and posterior probability are obtained and stored in a log file. The validation process uses landslides that have occurred during the period up to the active time step and checks the records of the probabilities and parameters values for those times steps with the values of the active time step. Each time a landslide has been positive identified new a-priory probabilities are recorded for each parameter. A complete log for the entire model is saved and used for statistical analysis and a NETCDF file is created and it can be downloaded from the server with the log file