World Academy of Science, Engineering and Technology
International Journal of Geological and Environmental Engineering
Vol:18, No:07, 2024

Reconstructability Analysis for Landslide Prediction

Authors : David Percy

Abstract : Landslides are a geologic phenomenon that affects a large number of inhabited places and are constantly being monitored and studied for the prediction of future occurrences. Reconstructability analysis (RA) is a methodology for extracting informative models from large volumes of data that work exclusively with discrete data. While RA has been used in medical applications and social science extensively, we are introducing it to the spatial sciences through applications like landslide prediction. Since RA works exclusively with discrete data, such as soil classification or bedrock type, working with continuous data, such as porosity, requires that these data are binned for inclusion in the model. RA constructs models of the data which pick out the most informative elements, independent variables (IVs), from each layer that predict the dependent variable (DV), landslide occurrence. Each layer included in the model retains its classification data as a primary encoding of the data. Unlike other machine learning algorithms that force the data into one-hot encoding type of schemes, RA works directly with the data as it is encoded, with the exception of continuous data, which must be binned. The usual physical and derived layers are included in the model, and testing our results against other published methodologies, such as neural networks, yields accuracy that is similar but with the advantage of a completely transparent model. The results of an RA session with a data set are a report on every combination of variables and their probability of landslide events occurring. In this way, every combination of informative state combinations can be examined.

Keywords : reconstructability analysis, machine learning, landslides, raster analysis
Conference Title : ICGGM 2024 : International Conference on Geosciences and Geological Mapping
Conference Location : Stockholm, Sweden
Conference Dates : July 15-16, 2024