Machine Learning Methods for Flood Hazard Mapping

Authors : Stefano Zappacosta, Cristiano Bove, Maria Carmela Marinelli, Paola di Lauro, Katarina Spasenovic, Lorenzo Ostano, Giuseppe Aiello, Marco Pietrosanto

Abstract : This paper proposes a novel neural network approach for assessing flood hazard mapping. The core of the model is a machine learning component fed by frequency ratios, namely statistical correlations between flood event occurrences and a selected number of topographic properties. The proposed hybrid model can be used to classify four different increasing levels of hazard. The classification capability was compared with the flood hazard mapping River Basin Plans (PAI) designed by the Italian Institute for Environmental Research and Defence, ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale). The study area of Piemonte, an Italian region, has been considered without loss of generality. The frequency ratios may be used as a standalone block to model the flood hazard mapping. Nevertheless, the mixture with a neural network improves the classification power of several percentage points, and may be proposed as a basic tool to model the flood hazard map in a wider scope.

Keywords : flood modeling, hazard map, neural networks, hydrogeological risk, flood risk assessment

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