Landslide Susceptibility within the binomial Generalized Additive Model

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We develop a slope-unit based landslide susceptibility model using the benchmark dataset proposed in the session, located in Central Italy. As a result, we produce two susceptibility maps based on the two different landslide presence attribute fields included in the dataset.

The proposed dataset is a subset of a much larger one, recently used to obtain landslide susceptibility all over Italy. We further explore the differences between results obtained from the proposed dataset, and landslide susceptibility obtained at national scale. The national scale results were obtained in a Bayesian version of a binomial Generalized Additive Model (GAM) in R-INLA, an R implementation of the integrated nested Laplace approximation for approximate Bayesian inference. The method can explain the spatial distribution of landslides using a family of Bernoulli exponential functions.

This allows us to estimate fixed effects and random effects, and to assess their associated uncertainty. The residual susceptibility maps and the most common correlations permit to measure the strength and direction of the relationships between models and to capture differences in susceptibility values across the study area. On their basis, we offer a convenient approach to evaluate the similarities in case of both represented landslide distributions.

We propose this modeling comparison for any susceptibility maps to evaluate the interpretability of the covariates and performances, where a large dataset may influence the susceptibility pattern over space.