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The control of statistical data-driven methods in landslide susceptibility assessment: the case of Lage - Salema basins, north of Lisbon, Portugal

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The computation of landslide susceptibility has concentrated in the last decades the attention of a large number of authors that attempted to define the most reliable statistical model for landslide susceptibility assessment. In the case of data-driven indirect statistical models, the assessment of landslide susceptibility is usually based on the assumption that the conditions that led to slope instability in the past are more likely to generate new instability in the future. Therefore, it is possible to assess the spatial behaviour of future slope movements by correlating the spatial distribution of past landslides with the data set of thematic layers representing independent slope instability conditioning factors (e.g. slope, aspect, geomorphology, lithology, soils and superficial deposits, land use, vegetation cover, etc.). The main goal of this study is to define the sensitivity of the landslide susceptibility results to the application of different statistical models. For this purpose we assess landslide susceptibility using the following methods: Information Value, Weights of Evidence, Bayesian Probability, Discriminant Analysis, Logistic Regression and Fuzzy Logic. These methods are applied over grid-cells terrain-unit. The study is developed on the test site of Lage-Salema (approximately 12 square kilometres) located northwards of the Lisbon region (Portugal). The study area includes two small catchments with a general direction south-north. Elevation within the study area ranges from 65 to 370 meters. The lithology is composed essentially by marls, clays, limestones and sandstones dated from the Kimmeridgian to the Tithonian (Upper Jurassic). The local geological structure is monocline and the

layers deep to south direction. The most important landslide types within the study area are the deep rotational and the shallow translational and rotational slides. Final results are compared through the computation of success-rate curves and prediction-rate curves, and through the calculation of the respective - Area Under the Curve (AUC).

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