

Ensemble of statistical EBF into a knowledge based AHP for slope failures mapping

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ABSTRACT

Landslide susceptibility mapping is considered as a hot research topic, due to its disastrous impact worldwide. Over the years, traditional GIS based Analytic Hierarchy Process (AHP) model has been popularly used to address this problem. Unfortunately, due to the subjectivity of the expert opinion in AHP model, a semi- quantitative model is always needed. In this study, an ensemble model is proposed using both evidential belief function (EBF) and AHP model. The study shows an innovative methodology to predict rainfall-induced susceptibility map in Kuala Lumpur city and surrounding areas using geographic information system (GIS). For inventory mapping, 220 landslide locations were collected using historical location data. The landslide location data was then used for training various landslide conditioning factors such as a topographic derived parameters, lithology, NDVI, landuse and landcover maps. For model validation, a receiver operating characteristics (ROC) graph showing false positive rate vs. the true positive rate was plotted. The newly developed ensemble model produced a reasonable accuracy in landslide susceptibility mapping for the study area. The final result may provide a valuable scientific basis for spatial decision making in planning and urban management studies.

Keywords: Landslides, susceptibility, GIS, remote sensing, ensemble method, AHP, EBF, Malaysia