



Landslide susceptibility mapping of a landslide-prone area by data mining

H.A. Nefeslioglu (1), E. Sezer (2), C. Gokceoglu (3), A.S. Bozkir (2), and T.Y. Duman (1)

(1) General Directorate of Mineral Research and Exploration, Department of Geological Research, 06520 Ankara, Turkey, (2) Hacettepe University, Department of Computer Engineering, 06800 Beytepe Ankara, Turkey, (3) Hacettepe University, Department of Geological Engineering, 06800 Beytepe Ankara, Turkey

Some detrimental effects resulting from landslides on human life and economy of many nations are observed throughout the world. Owing to these effects of landslides, landslide susceptibility evaluation is one of the hot topics in international landslide literature. Various methods such as simple overlay, bivariate and multivariate statistics, fuzzy logic and artificial neural networks have been applied on landslide susceptibility evaluation. However, the data mining technique, one of the most efficient methods, has not been used for this purpose up to now. For this reason, the purpose of the present study is to apply the data mining in landslide susceptibility evaluation of a landslide-prone area (Cekmece, Istanbul, Turkey). For the purpose of the study, a detailed landslide inventory has been used. Approximately 19.2% of the study area is covered by deep-seated landslides. The landslides that occur in the area are primarily located in sandstones with interbedded permeable and impermeable layers such as claystone, siltstone and mudstone. 31.95% of the total landslide area is located at this unit. In the study area, the landslides have been triggered by heavy rainfall in general. When applying data mining and extracting decision tree, lithological units, altitude, slope, plan curvature, profile curvature, heat load and stream power index have been used as landslide conditioning factors. According to the results of decision tree, two lithological formations, stream power index and slope are the most effective parameters on the landslide occurrence in the study area. Using the predicted values, the landslide susceptibility map of the study area has been produced. To assess the performance of the produced susceptibility map, the area under ROC curve (AUC) has been drawn. The minimum value of AUC is 0.5 means no improvement over random assignment while the maximum value of that is 1 denotes perfect discrimination. The AUC value of the produced landslide susceptibility map has been obtained as 0.896. According to the results of the AUC evaluation, the produced map has exhibited good performance. This result has also showed that the produced map can be used for regional planning works.