

Quantitative Analysis of Landslide Susceptibility and Occurrence of Landslides at Catchment Scale Using Data Mining Techniques

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The purpose of this study is to analyze and evaluate the landslide susceptibility at catchment scale in the Akaishi Mountains using Decision tree technique which is a kind of data mining techniques. Estimation processes are explicitly and quantitatively represented by tree-structures of Decision tree technique, therefore, tree-structures of the Decision tree model were also analyzed.

To analyze the landslide susceptibility, topographic characteristics (elevation, slope angle, profile curvature, plan curvature, dissection and undissection height) and lithology were used as explanatory variables. These topographic characteristics were calculated from the DEM (Digital Elevation Model). Objective variable was landslides data which occurred or enlarged from 1992 to 2002 as depicted by satellite image analysis.

Landslide susceptibility was examined from the ensemble learning using Decision tree technique.

In order to evaluate the landslide susceptibility, landslides data which occurred or enlarged from 2002 to 2004 was used.

Accuracy of landslide susceptibility detected by Decision tree technique is as large as 82.4%. This estimation is accurate enough in comparison with previous studies. Namely, Decision tree technique can analyze the landslide susceptibility with high accuracy. Landslide susceptibility was evaluated using landslides data which occurred or enlarged from 2002 to 2004. It was clarified that from 2002 to 2004, landslides tend to occur or enlarge in the catchments which have high landslide susceptibility. Consequently, landslide susceptibility in this study demonstrates the occurrence or enlargement of landslides in the Akaishi Mountains.

Tree-structures indicate that landslides occurred or enlarged frequently in the catchments which have larger than 29 degrees and 33 degrees in average and mode of slope angle, respectively. This result well agrees with previous studies, and, tree-structures of Decision tree indicate important explanatory variables at the higher order in the tree-structure. In conclusion, this study indicates the quantitative relationship between occurrence of landslides, topography and lithology.