

Automatic landform classification using Self-Organizing Map (SOM) by geomorphological features calculated from DEM

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The landform classification map based on the various geomorphological features which calculated from DEM data is adopted in many scenes of the modern society. As is well known, Iwahashi and Pike (2007) had proposed a classification method of terrain by using slope gradient, local convexity, and surface texture. In this research, we tried to automate landform classification by using Self-Organizing Map (SOM) which is an unsupervised neural network. It is aimed at grasping the influence on the classification result depending on the combination of the geomorphological features used. The target area in this preliminary study is the same area as Iwahashi and Pike (2007); the southern part of Yatsugatake located at the prefecture boundary between Yamanashi prefecture and Nagano prefectures (about 22.5 km east-west, about 20.0 km north and south).

The SOM was carried out by the following procedure. Calculate the amount of slope gradient, surface texture, local convexity, direction of dip, the ridge valley degree, surface curvature, and the hill figure from DEM data. ② These geomorphological features were combined and adopted as input data to SOM. Totally seven patterns of geomorphological features were selected. ③ For these data, learning by SOM was conducted, and seven landform classification maps were obtained. Also, in order to visualize the features of classification by SOM, a histogram of each feature was also calculated. (4) The classification results were compared based on the landform classification maps and histograms, and the influence of the classification result by combination of the geomorphological features used was examined. We also compared SOM results with the classification results by Iwahashi and Pike (2007) method. In concludingly, it was found that in the automatic landform classification by SOM using multiple geomorphological features, the relatively uniformly distributed topographical feature quantities greatly affect classification compared to biased terrain feature. We also found that the topographic features with histograms with symmetric distribution and narrow histograms do not have a significant effect on topographic classification results by SOM. We would like to consider an application of supervised neural network and to obtain a landform

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