Landslide Recognition using Remote Sensing Images and PCANet

*Yimei Wei[1], Takashi Oguchi[1]

1. Graduate School of Frontier Science, the University of Tokyo

Landslides are complex geological phenomena that can cause serious damage to the natural and social environments and may result in a significant loss of lives and properties. Consequently, landslide recognition, mapping, and monitoring are important for the prevention of secondary disasters and post-disaster relief. Since various remote sensing images have become more accessible in recent years, the use of satellite and aerial imagery for geological disasters has become a hot research topic. When remote sensing images are used to recognize landslides, image feature extraction is the main technical issue, and inefficiency in extracting ground object features has been a major challenge. This study explores the use of a simplified deep learning network structure, PCANet, to learn image features from post-disaster remote sensing images and train the classifier. This approach reduces the computation time of feature extraction and improves the efficiency of landslide recognition. The materials for training PCANet are image data sets for several areas in Japan including both landslide and non-landslide samples. They were collected from vertical aerial photographs and orthophotographs provided by the Geospatial Information Authority of Japan (GSI). In addition, post-disaster landslide distribution maps provided by the National Institute of Geosciences and Disaster Recovery (NIED) and GSI were utilized in the selection of sample images. As the analyzed remote sensing images were taken in a short time after a serious geological disaster, this research also contributes to future rapid responses to landslide hazards.

Keywords: Landslide recognition, Image feature extraction, PCANet, Machine learning

