

Automatic vegetation identification in the satellite image using a convolutional neural network

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Image based object identification and classification would be a promising tool to implement the mapping the biodiversity with high spatio-temporal resolution. Since convolutional neural network (CNN) technique achieve highly accurate object detection and classification, it has become a new solution in the field of remote sensing. However, detection or classification of vegetation in the satellite images are still challenging task because vegetation in the satellite images often represents ambiguous and amorphous shape.

Recently, Ise et al., (2018) developed a method (chopped picture method) to conveniently classify the ambiguous and amorphous objects. This method dissects the images into numerous small squares and efficiently produces the training images. In this study, we investigated the potential for adapting the chopped picture method to classify the 3 vegetation types (Bamboo, Deciduous forest and Conifer forest) in Google Earth images.

We obtained Google Earth images from three regions in Japan. By applying the deep convolutional neural network, the model successfully learned the features of each vegetation in Google Earth images, and the best trained model correctly classify the vegetation types. Our results also show that identification accuracy strongly depends on the image resolution and number of classification class. Our results suggest that CNN and the chopped picture method can potentially become a powerful tool for high accuracy automated detection and mapping of vegetation.

Keywords: Convolutional neural network, Remote sensing, Vegetation mapping, Google Earth imagery