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Classification of Paddy Fields using Convolutional Neural Network with MODIS imagery in Northeast Asia

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A satellite image-based classification for crop types can provide information on an arable land area and its changes over time. The classified information is also useful as a base dataset for various geospatial projects to retrieve crop growth and production processes for a wide area. Convolutional neural network (CNN) algorithms based on a deep neural network technique have been frequently applied for land cover classification using satellite images with a high spatial resolution, producing consistent classification outcomes. However, it is still challenging to adopt the coarse resolution images such as Moderate Resolution Imaging Spectroradiometer (MODIS) for classification purposes mainly because of uncertainty from mixed pixels, which can cause difficulty in collecting and labeling actual land cover data. Nevertheless, using coarse images is a very efficient approach for obtaining high temporal and continuous land spectral information for comparatively extensive areas (e.g., those at national and continental scales). In this study, we will classify paddy fields applying a CNN algorithm to MODIS images in Northeast Asia. Time series features of vegetation indices that appear only in paddy fields will be created as 2-dimensional images to use inputs for the classification algorithm. We will use reference land cover maps with a high spatial resolution in Korea and Japan as training and test datasets, employing identified data in person for validation. The current research effort would propose that the CNN-based classification approach using coarse spatial resolution images could have its applicability and reliability for the land cover classification process at a continental scale, providing a direction of its solution for the cause of errors in satellite images with a low spatial resolution.