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HYPERSPECTRAL IMAGE CLASSIFICATION USING DEEP CONVOLUTIONAL NEURAL NETWORK

Abstract

Hyperspectral images have been widely used in a large mount of fields, such as agriculture investigation, military detection, mineral exploration, etc. In these applications, images classification plays an important role. Generally, the class of each pixel should be predicted.

One main limitation in hyperspectral images classification is that the data volume is too large to be processed promptly, as there are lots of channels in the spectral field of hyperspectral images. Naturally, data compression is quite necessary. In this paper, Principal Component Analysis (PCA) is utilized to conduct data compression in the spectral field, making all channels into only one channel, i.e. the principal component channel.

Regarding the principal component image, lots of classification models can be used to predict the class of each pixel. In this paper, Convolutional Neural Network (CNN) is chosen to conduct pixel classification. First, 16×16 clips centered in each pixel are cut out as training images for the CNN. Second, as to the network architecture, 3 convolution layers and 3 pooling layers are stacked, 3×3 convolution filters and 2×2 pooling stride are used respectively. During classification, hyperspectral images are processed by the same steps as in the training stage.

The method mentioned above is tested in public hyperspectral images dataset, and achieves quite promising performance.