The Effect of Image Compression Level on the Land-cover Classification Accuracy of ALOS-AVNIR2 Data using Pixel-based and Object-based Approaches

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ABSTRACT

The use of compression techniques for reducing image size has been found in daily activities including remote sensing, since they can make display, storage and transfer of data more efficiently. Many image processing softwares can accept and analyse compressed images, but on the other hand, image compression can also cause loss of details of the data. Loss of details gives consequence on the spectral data integrity, and thus give influence on the quality of the derived data such as multispectral classification results. However, studies on this issue were still rarely carried out in South East Asian wet tropical countries, where very complex land-use phenomena exist. During the past ten years, information extraction methods using OBIA (object-based image analysis) are rapidly growing, and study on the influence of image compression level on image classification accuracy is still required, particularly in comparison with commonly used pixel-based classification approaches.

This study tried to compare the effects of image compression level on the land-cover classification accuracy based on both per-pixel and object-based approaches. The study was carried out in Salatiga and Ambarawa region (Central Java, Indonesia) using ALOS AVNIR2 multispectral imagery at 10 m spatial resolution, which consists of blue, green, red and near infrared bands. Prior to the classification process, the image dataset was compressed into JPEG files at different levels, *i.e.* 10, 30, 50, 70 and 90 percents compression respectively. Meanwhile, the original uncompressed data was kept as a control. The smaller compression level indicates the lower degree of data quality and vice versa. Classification processes using pixel-based approaches, *i.e.* minimum distance to mean, parallel-epiped, and maximum likelihood were run using original image and various levels of compression. Parallel to that processing, an object-based image classification was also applied to the same datasets. Each classification result was then evaluated with respect to its accuracy level.

It was found that, in general, results obtained from the pixel-based and object-based classifications show a declining trend, in line with the increase in image compression level. For the pixel-based classification of the original image, the maximum likelihood algorithm delivered the highest accuracy. However, this algorithm performed worst when applied to compressed images. In contrast to those results, the minimum distance to mean algorithm performed relatively consistent for all compression levels, while the paralell-epiped showed nearly consistent low accuracy levels for all types of input images. This study suggested that image classification should avoid input from lossy compressed images, even though OBIA performed better than per-pixel classifiers. More specifically, distribution and transfer of remotely sensed data in compressed format for research purposes should include information on the compression level and suggested classification methods.

Keywords *: remote sensing, image compression, image classification, OBIA, classification accuracy, ALOS AVNIR2, land-cover classification.*