Random Forest Classification of Jambi and South Sumatera using ALOS PALSAR Data

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ABSTRACT

Recently, Synthetic Aperture Radar (SAR) satellite imaging has become an increasing popular data source especially for land cover mapping because its capability to image through clouds, haze, and smoke those cause serious problems for optical satellite sensor observations in the tropical areas. This paper shows a study on an alternative method for land cover classification of ALOS-PALSAR data using Random Forest (RF) classifier. RF is a combination (ensemble) of tree predictors such that each tree depends on the values of a random vector sampled independently and with the same distribution for all trees in the forest (Breiman, 2001). The classification works as follows: the random trees classifier takes the input feature vector, classifies it with every tree in the forest, and outputs the class label that received the majority of "votes". During the training, a different subset of training data are selected with replacement to train each tree, while remaining training data are used to estimate error and variable importance. In this paper, the performance of the RF classifier for land cover classification of a complex area is explored using ALOS PALSAR data (25m mosaic, dual polarization) acquired on the area of Jambi and South Sumatra, Indonesia. There are nine different classes discriminated: forest, rubber, mangrove & shrubs with trees, oilpalm & coconut, shrubs, cropland, bare soil, settlement, and water. Overall accuracy of 88.93% is obtained, with producer's accuracies for forest, rubber, mangrove & shrubs with trees, cropland, and water class are greater than 92%.

Keywords : Land cover, ALOS-PALSAR, Random Forest (RF), classification.