IMPROVING THE ACCURACY OF LAND USE AND LAND COVER MAPS USING PRIORITIZED COMPOSITING OF MULTIPLE IMAGE CLASSIFICATION ALGORITHM OUTPUTS

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Abstract

Improving the accuracy of land use and land cover (LULC) maps is one of the key objectives of practitioners of land cover mapping. This is generally achieved by, among others, increasing the size of training samples, selecting across the range of variations in each class, limiting the number of classes, using more robust classification algorithms and compositing the outputs of multiple classification algorithms. This study proposes the use of a prioritised majority composite of the results of multiple image classification algorithms to achieve a more robust improvement in image classification accuracy. A Landsat image was classified using four classification algorithms, namely Maximum Likelihood Classifier (MLC), Random Forest Classifier (RFO), Support Vector Machine (SVM) and K-Nearest Neighbour (KNN) to produce intermediate LULC maps. The overall classification accuracy was computed for each intermediate LULC map, yielding 70.47%, 73.15%, 72.14% and 71.14% respectively. The producer accuracy was calculated for each of the input classes in the intermediate LULC maps. For reference, a second composite LULC map was derived by performing a simple majority composite across the four intermediate images. The overall accuracy of this reference composite LULC map was calculated to be 78.14%. A final LULC composite map was derived from the four intermediate LULC maps by selecting, for each pixel, the class with the highest producer accuracy. The overall accuracy of the final LULC composite was calculated, yielding a result of 90.23%. The results show that using the producer accuracy as the selector for the composite image results in a far more accurate output than the result obtained from a single classification algorithm or a simple majority composite across multiple classification algorithms.