



Semi-Automated Classification of Gray Scale Aerial Photographs using Geographic Object Based Image Analysis (GEOBIA) Technique

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Aerial photography is an important source of high resolution remotely sensed data. Before 1970, aerial photographs were the only remote sensing data source for land use and land cover classification. Using these old aerial photographs improve the final output of land use and land cover change detection. However, classic techniques of aerial photographs classification like manual interpretation or screen digitization require great experience, long processing time and vast effort. A new technique needs to be developed in order to reduce processing time and effort and to give better results. Geographic object based image analysis (GEOBIA) is a newly developed area of Geographic Information Science and remote sensing in which automatic segmentation of images into objects of similar spectral, temporal and spatial characteristics is undertaken. Unlike pixel-based technique, GEOBIA deals with the object properties such as texture, square fit, roundness and many other properties that can improve classification results. GEOBIA technique can be divided into two main steps; segmentation and classification. Segmentation process is grouping adjacent pixels into objects of similar spectral and spatial characteristics. Classification process is assigning classes to the generated objects based on the characteristics of the individual objects. This study aimed to use GEOBIA technique to develop a novel approach for land use and land cover classification of aerial photographs that saves time and effort and gives improved results. Aerial photographs from 1954 of Valle Telesina in Italy were used in this study. Images were rectified and georeferenced in Arcmap using topographic maps. Images were then processed in eCognition software to generate land use and land cover map of 1954. A decision tree rule set was developed in eCognition to classify images and finally nine classes of general land use and land cover in the study area were recognized (forest, trees stripes, agricultural crops fields, olive tree fields, vineyards, mixed vineyards and olive trees, roads, rivers and urban areas). Results showed that in the segmentation process, greater values of scale, shape and compactness parameters are more suitable for classifying forest and river objects. While lower values of scale, shape and compactness parameters are more suitable for classifying objects of agricultural crops fields, olive tree fields, vineyards, mixed vineyards and olive trees, roads and urban areas. Applying map accuracy assessment test revealed high accuracy of the generated map of approximately 87%. Forest and river objects were recognized through the main spectral signal value of the object. Tree stripes were recognized through the object's main spectral signal value, shape and size. Many different features were used for classifying the other classes' objects. Among others, features like object's density, texture, relative border to other classes, width, contrast and standard deviation were used in the classification process. The results showed that after developing the rule set process tree, classifying an aerial photograph can be faster by more than thirty times the classical techniques based on the computer machine speed. Generally, GEOBIA is a promising technique for classifying and interpreting gray scale aerial photographs.