

Automated land use/land cover classification of very high resolution GeoEye-1 imagery using an object-oriented rule-based method

Chenghua SHI^a, Chew Wai CHANG^b Jukka MIETTINEN^c and Soo Chin LIEW^d

^aAssociate Scientist, Centre for Remote Imaging Sensing and Processing (CRISP), National University of Singapore (NUS), Lower Kent Ridge Road, Blk S17, Singapore 119076, Tel: +65-65165564; Fax: +65-67779578; Email: crssc@nus.edu.sg

^bResearch Scientist, Centre for Remote Imaging Sensing and Processing (CRISP), National University of Singapore (NUS), Lower Kent Ridge Road, Blk S17, Singapore 119076, Tel: +65-65164322; Fax: +65-67779578; Email: crsccw@nus.edu.sg

^cResearch Scientist, Centre for Remote Imaging Sensing and Processing (CRISP), National University of Singapore (NUS), Lower Kent Ridge Road, Blk S17, Singapore 119076, Tel: +65-65166184; Fax: +65-67779578; Email: crsjim@nus.edu.sg

^dPrincipal Research Scientist, Centre for Remote Imaging Sensing and Processing (CRISP), National University of Singapore (NUS), Lower Kent Ridge Road, Blk S17, Singapore 119076, Tel: +65-65165069; Fax: +65-67757717; Email: scliew@nus.edu.sg

Abstract: Land use/Land cover classification has always been an important topic of imagery analysis of earth science. The improved spatial resolution of satellite imagery over the past ten years has enabled the production of detailed Land use/Land Cover maps. In recent two decades, object oriented image classification has been increasingly used in land area mapping and feature extraction and has shown big advantages over pixel based imagery analysis in many cases. High spatial resolution satellite images such as Geoeye-1 can be used to produce detailed and useful Land Use/Land Cover map. Classification schemes used for such purposes are mostly scene dependent.

In this paper, we aim to develop automatic/semi-automatic techniques for land cover classification taking into account the special features of landscape in Southeast Asia. A commercial off-the-shelf object oriented based classification software was used. The software was used to segment the image data into polygons which were then classified with a rule based system. The technique was tested on a GeoEye-1 image over a mainly rural / agricultural area in northern Peninsular Malaysia. The classified product was compared to a ground truth map. The ground truth map was produced by classification of the image into a very dense network of polygons. Each polygon was assigned a class with supervised classification. From the confusion matrixes generated accuracy assessments of classification were made. The overall accuracy is 86%. The same rule set was applied to another GeoEye-1 image of an area in central Peninsular Malaysia acquired on a different date with an overall classification accuracy of 75%. This reasonably high accuracy strongly suggests that the rule-based method is quite robust and can be applied on other scenes.

KEY WORDS: Land Cover, Object Oriented classification, GeoEye-1

