Supervised classification methods for deriving land cover maps from satellite images

J. S. Borges

Faculdade de Ciências, Universidade do Porto

Dep. Matematica Aplicada, Rua do Campo Alegre, 687, 4169-007 Porto, Portugal

Tel. +351 220100840, Fax: +351 220100809, e-mail: jsborges@fc.up.pt

High spatial resolution satellite sensors such as Landsat TM and ASTER are a privileged data source for the production of land cover maps. Data from these sensors has recently become available free of charge, or with very small costs, allowing for frequent updates in land cover mapping to be carried out. The accurate classification is an important task to extract information from multi-spectral images, such as land cover maps, in a reliable way. This is not easily achieved, since it is not always possible to have enough data to support good classification practice. The classification performed in this work was based on image objects instead of individual pixels. This approach has the advantage of producing a more realistic thematic map, but has the disadvantage of inserting noise to the classified objects.

Two of the classification methods used in this work are well known: the K-Nearest Neighbours (K-NN) and the Logistic Discrimination (LD). Competing with these two methods was the Support Vector Machine (SVM) classifier, a relatively new method that proved to be quite effective. Data dimensionality reduction methods were also used, and the classifiers performance on the reduced datasets was tested. The classifiers performed much better with data transformed by Linear Discriminant Analysis (LDA) than with Principal Component Analysis (PCA). Initially, due the lack of training data, a cross-validation estimation of the classification error was made. At a later stage, when an independent validation dataset was made available, the classifiers were further evaluated. This independent validation confirmed the results obtained by cross-validation, in terms of the relative performance of the classifiers, although the accuracy values were considerably lower.