

Supervised Image Classification in the Annapolis Valley, Nova Scotia

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Introduction

The purpose of this project was to use the Erdas Imagine Software to conduct a supervised image classification. The study area for this project was the Annapolis Valley. The image used for classification was a Landsat 8 combined image taken on September 5, 2014. In addition students from the Centre of Geographic Sciences (COGS) conducted a "ground truthing" exercise in early October. Students visited a collection of field sites and took detailed notes describing the locations. Ground truthing locations are labelled on the Landsat true color image (Fig. 1a)

Supervised Classification

The Erdas Imagine software package was used to perform a supervised classification. In a supervised classification the image analysis specialist 'trains' the software by identifying known classes. The software then uses these classes to identify spectrally similar areas and groups them together.

To accomplish this task in Erdas representative areas of interest (AOIs) were selected which were representative of each class. To increase the accuracy of the classification additional training areas need to be selected. For this project at least 5 AOIs were used per defined class.

The AOIs were then loaded to the Erdas Signature Editor and grouped to form classes. After all of the classes were selected a separability report and plot (Figure 2) were generated.

Fig 1a. True color Landsat 8 image showing ground truthing locations.

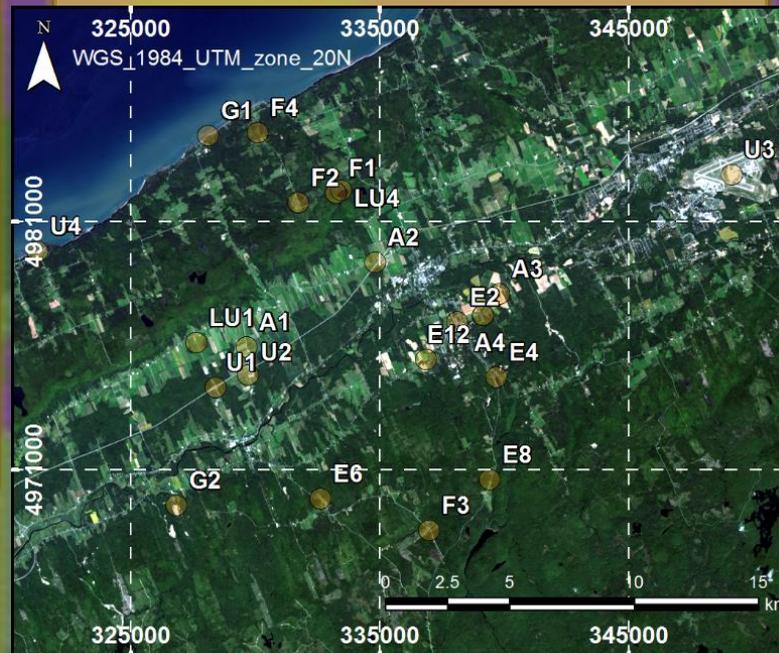
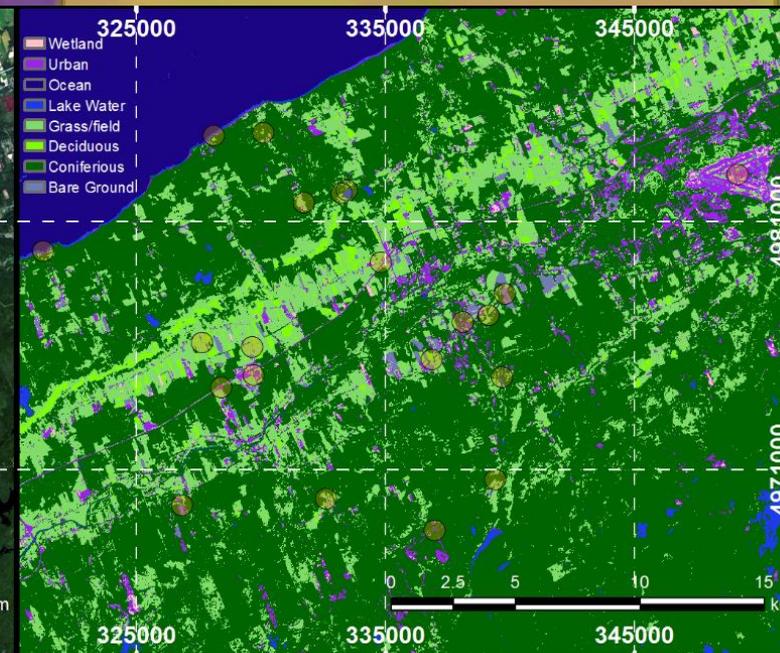


Fig 1b. Reclassified Landsat 8 image, colors described in legend.



correlation mapper. Out of these methods minimum distance was selected as the best method (shown in Figure 1b). The majority of the methods had difficulty separating coniferous trees from urban areas. In an attempt to correct this additional AOIs were added to the classification. Even with the additional AOIs only the minimum difference method consistently separated these groups.

Overall the minimum distance method did a very good job with the major groupings as described by the separability graph. In particular the urban zones are highlighted very well as is a band of deciduous trees along the southern slopes of the north mountain. As was expected several farm fields were classified as deciduous trees due to spectral signature overlap.

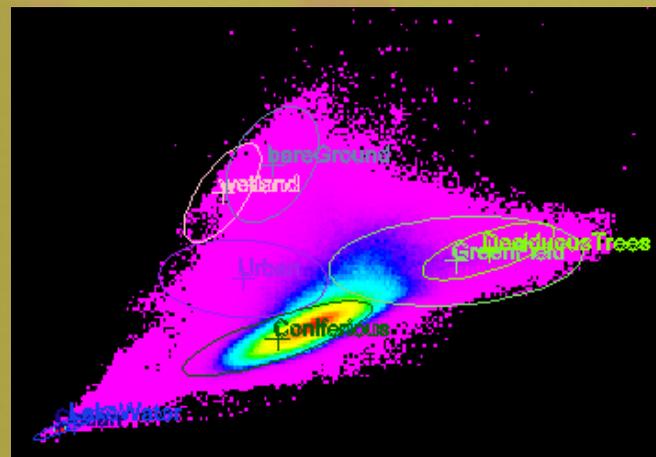


Fig 2. Separability plot comparing bands 5 and 6 generated for the supervised image classification.

As shown in the plot there is very good separability between urban, coniferous, water, wetland/bare ground and deciduous trees/grass land. The deciduous tree class is contained completely within grass/field and will be very difficult to separate. The classes of ocean water and fresh water also completely overlap. There is some overlap (not complete) between wetlands and bare ground. In addition this diagram also shows a density diagram, and it reveals that the majority of pixels in the image fall around the coniferous tree class. This can be verified visually on the Landsat 8 image.

Supervised Classification

The supervised classification was conducted using parametric rules. The parametric rules assessed included: maximum likelihood, mahalanobis distance, minimum distance, spectral angle mapper and spectral

Accuracy Assessment

After the supervised classification was completed the accuracy of the results was assessed. The classified results on the map were compared to the locations visited by COGS students. The actual GPS locations given for the sites had some errors which occurred when the point was collected from the road but described a feature visible in the distance. Due to this error in the point locations slight adjustments were used when scoring correct answers. Overall 19 / 24 (79.2%) were correct. This level of accuracy was deemed acceptable for this project.