Forest species classification using Object Oriented Image Analysis – does CIR aerial imagery and Object Oriented Methods offer new possibilities?

Christine Brown

University of Edinburgh &
Forest Research
Northern Research Station
Roslin
Midlothian
EH25 9SY

christine.brown@forestry.gsi.gov.uk

Introduction

National Forest Inventories (NFI) in Britain such as the Forestry Commission's National Inventory of Woodlands and Trees (NIWT) and the Scottish Native Woodland Survey (SNWS) provide a synoptic view of the current extent, condition and location of forest resources.

The NFI's not only need to be accurate and precise but also up-to-date. The methodology implemented in Britain relies on photo-interpretation analysis of digital aerial photographs combined with field-based methods. This methodology, besides its advantages, is perceived as cost-intensive.

Development of a cost effective and reliable methodology to identify tree species as an automated process would be of major benefit to forest management.

Research

This research explores object oriented classification methods for FI classification on three levels using 40cm resolution Colour InfraRed Imagery.

1. Woodland/Non woodland, 2. Interpreted Forest Types (IFT) and 3. Species.

IFT level data is currently being manually digitised within the NIWT2 project. This research aims to produce a semi-automated methodology, which not only delineates IFT but also species.

Study Area

A study area was chosen of approximately 17 x 12 km (70% forest area) within Clocaeanog Forest, Wales (OS Grid ref 300973, 352997.)

A large study area was chosen with the intention of proving the robust nature of the developed ruleset. The imagery is available in the form of 1km x 1km tiles flown throughout 2006 which resulted in variations across the study area of sun angle, cloud cover, vegetation, intensity and many others.

Method
Using Definiens Developer software, object oriented segmentation and classification was conducted on several levels using different scale parameters to construct a hierarchical image object network. Objects were extensively analysed by studying their signature outputs to identify feature characteristics which could be associated with initially Woodland/non woodland, then Broadleaved and Coniferous woodland and finally individual species recognition.