

# INCREASED PRODUCTION CHAIN EFFICIENCY USING OBJECT BASED IMAGE ANALYSIS: A CASE STUDY

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GIM nv will be proud to present a poster about our latest Object Based Image Analysis project at the first International OBIA Conference of July 2006 in Salzburg.

GIM's Earth Observation department has several years of experience with Object Based Image Analysis and more specifically with the Definiens eCognition software. In the past years, our team realised several projects using this advanced technology. The latest project evaluates the semi-automised object classification to increase production chain efficiency. This higher efficiency was realised using the objectoriented approach with the segmentation process that allows transforming raster images into meaningful objects, the context enabled analysis and the powerful knowledge bases taking spectral, texture and shape characteristics of the objects into account, together with ancillary data.

## **The project methodology**

Case studies were elaborated for the automated detection of water bodies, built-up area and change detection of built-up area. Several indices were worked out into knowledge bases, to ensure transferability to different satellite images. Consequently, the same methods could be used on very different images all over Europe, without having to select training areas for the analysed classes.

For the classification of water bodies, iteration techniques were tested using seeds, objects that are certainly classified correctly. For the classification of these seeds, mainly texture and spectral aspects were taken into account. The iterations test the objects around the seeds on resemblance, which will be an important criterion for further classification of water bodies. These seed techniques using texture, spectral properties together with context turned out to be the most efficient way to obtain highly accurate water body classifications, ensuring transferability trough different images.

The classification techniques for built-up area detection were based on strong edges present in the infrared and red bands. Methods were elaborated to detect these edges and classify their surroundings. Similar knowledge bases were used to detect non-built parcels in areas dedicated to built-up area, using ancillary data like regional land use planning maps and land registers.

The case studies used IKONOS satellite imagery with a resolution of 1 meter over several sites in Europe. However, the elaborated methods are transferable, which means they can be used on other remote sensing data.

## **The project results**

The result of this innovation project contains a detailed comparison between time spent for conventional pixel – based classification and for object based classification. The shortening of production times was calculated taking entire production chains as well as part of the chains into account. Interesting results were obtained, as the chain can significantly be shortened without having to give in to the applicable quality standards.

To test the results with the quality standards, the obtained classifications were validated with highly accurate available data, showing significant improvements using the automated detection techniques.

With this innovation study, we perceive the development of geographic information layers now from a process based approach where each process step needs to be investigated for its potential to be automated. With segmentation, the delineation of the geometry can be done fully automated. For the classification of the objects, dedicated automated methods using indices and seed techniques can be worked out to significantly improve classification results.

This study indicates it is possible to decrease production times up to a factor of 65% by applying objectoriented image processing techniques.

## **GIM company background**

GIM nv is a Belgian private company establishing its place in the GEO-ICT service market and defining itself as a proven provider of information management services and products in the select areas of Geographic Information Systems (GIS), information technology, bespoke application development and earth observation. The company has a European-wide client base. Its staff is interdisciplinary in nature, holding university degrees in geography, cartography, agricultural engineering, informatics and urban and regional planning.