EARTH CASE STUDY

Using eCognition to detect informal settlements from IKONOS images

Detecting informal settlements might be one of the most challenging tasks within urban remote sensing. To carry out the urban planning and development tasks in developing countries informal settlements should be recorded to obtain an adequate spatial data basis. This can only be realized through the analysis of remote sensing data. Due to their microstructure and instability of shape, the detection of informal settlements from remote sensing data is substantially difficult. Hence, more sophisticated data and methods of image analysis are necessary. In the project present firstly settlement areas in general have been detected which secondly have been distinguished into formal and informal settlements.

The general settlement objects were generated by a very coarse top-level segmentation (Fig. 1). Via a fine-image segmentation (Fig. 2) context and texture information was derived to give base-level objects. To distinguish settlement areas from other forms of land use at the top level, mainly textural features based around shape (such as mean size of sub-objects) and the variability in color of small sub-objects (such as average mean difference to neighboring objects) were used. In addition contextual information such as a higher relative frequency of small shadows and lower relative area of vegetation within settlement areas enhanced the initial classification result.

Typical of informal settlements was a lower mean asymmetry of sub-objects - which reflects the average elongation of sub-objects - mirroring the lack of a road network. A further typical context feature is a lack or paucity of red or bright roofs, since informal settlement buildings are usually made from wood, plastic or steel sheets.

As regards the developed rule base eCognition (Fig. 3) allows the description of knowledge about phenomena (such as typical textures or the existence of certain objects) clearly and easily using fuzzy membership functions. The described knowledge stored in the classification rule base leads to best classification results (Fig. 4).

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The IKONOS data was provided by the Department of Geomatics, University of Cape Town to be used in a joint project

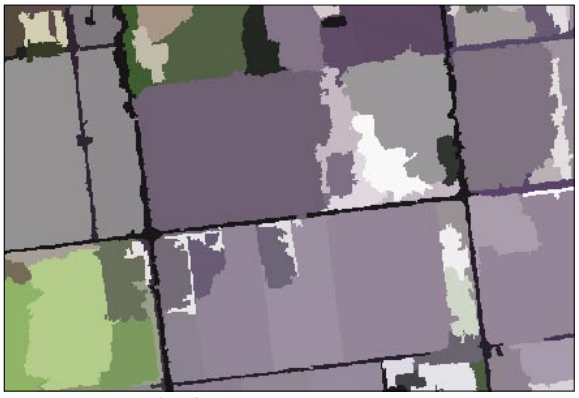
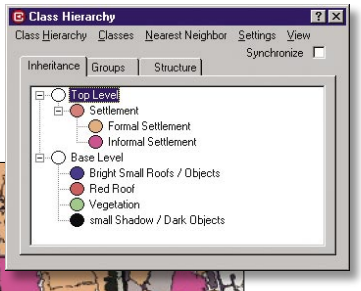


Fig. 1: coarse top-level segmentation

Fig. 2: fine segmentation

Fig. 3: classification rule base



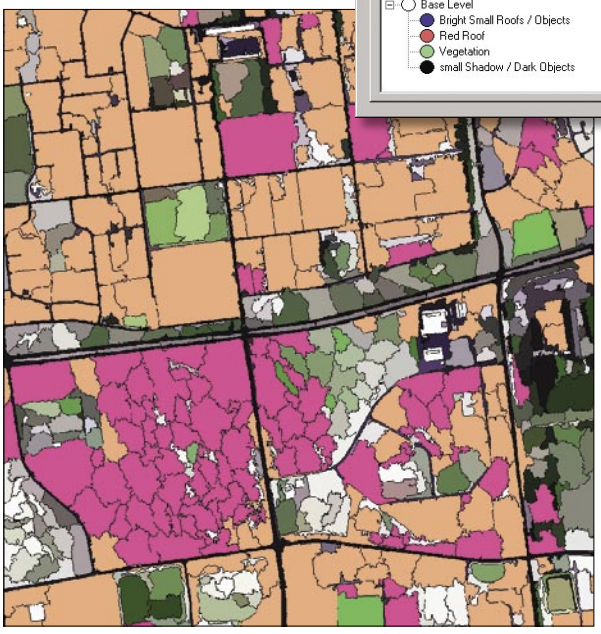


Fig. 4: classification result

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