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SUPPORT VECTOR MACHINE CLASSIFICATION OF OBJECT-BASED DATA FOR CRC MAPPING, USING MULTI-TEMPORAL LANDSAT IMAGERY

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Abstract. Crop mapping and time series analysis of agronomic cycles are critical for monitoring land use and land management practices, and analysing the issues of agro-environmental impacts and climate change. Multi-tempor Landsat data can be used to analyse decadal changes in cropping patterns at field level, owing to its medium spat resolution and historical availability. This study attempts to develop robust remote sensing techniques, applicable ac a large geographic extent, for state-wide mapping of cropping history in Queensland, Australia. In this context, traditional pixel-based classification was analysed in comparison with image object-based classification using advan supervised machine-learning algorithms such as Support Vector Machine (SVM).

For the Darling Downs region of southern Queensland we gathered a set of Landsat TM images from the 2010 – 20 cropping season. Landsat data, along with the vegetation index images, were subjected to multiresolution segmentation to obtain polygon objects. Object-based methods enabled the analysis of aggregated sets of pixels, exploited shape-related and textural variation, as well as spectral characteristics. SVM models were chosen afte examining three shape-based parameters, twenty-three textural parameters and ten spectral parameters of the objects.

We found that the object-based methods were superior to the pixel-based methods for classifying 4 major landuse/ cover classes, considering the complexities of within field spectral heterogeneity and spectral mixing. Comparativ analysis clearly revealed that higher overall classification accuracy (95%) was observed in the object-based SVM compared with that of traditional pixel-based classification (89%) using maximum likelihood classifier (MLC). Objec based classification also resulted speckle-free images. Further, object-based SVM models were used to classify diffe broadacre crop types for summer and winter seasons. The influence of different shape, textural and spectral variab and their weights on crop-mapping accuracy, was also examined. Temporal change in the spectral characteristics specifically through vegetation indices derived from multi-temporal Landsat data, was found to be the most critica

information that affects the accuracy of classification. However, use of these variables was constrained by the dat availability and cloud cover.

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