

Automatic habitat classification methods based on satellite images: A practical assessment in the NW Iberia coastal mountains

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Abstract Although remote sensing is increasingly in use for habitat mapping, traditional image classification methods tend to suffer shortcomings due to non-normality of spectral signatures, as well as overlapping and heterogeneity in radiometric responses of natural and semi natural vegetation. Methods using non-parametric classifiers and object-oriented analysis have been suggested as possible solutions for overcoming these limitations. In this paper, we aimed at evaluating the performance of some of these techniques for the European Natura 2000 network of protected areas habitats mapping. For this purpose, we tested different methods of supervised image classification in the Northern Mountains of Galicia, Spain, an area included in the Natura 2000 network, which is characterized by a highly heterogeneous landscape. Methods involved the use of maximum likelihood and nearest neighbour

decision rules in per-pixel and per-object classification analyses on Landsat TM imagery. Per-object classifications were completed using the segment mean and segment means plus standard deviation feature spaces. The results showed the existence of significant differences in the accuracies for the different methodologies, their strengths and weaknesses and identified the most adequate approach for habitat mapping. Analyses pointed out that significant improvements in accuracy were achieved only under certain combinations of per-object analysis, non-parametric classifiers and high dimensionality feature space.

Keywords Landsat · Maximum likelihood · Nearest neighbour · Natura 2000 habitats · Object oriented · Pixel oriented · Remote sensing · Supervised classification

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Introduction

Most of natural and semi-natural ecosystems in European mountain areas are exposed to a variety of threats, such as the intensification and industrialization of agricultural and forest land uses, the abandonment of traditional farming activities and the emergency of industrial uses (McDonald et al. 2000; Bielsa et al. 2005; Mitchley et al. 2006). The need to protect these areas involving habitats of interest in terms of biodiversity conservation has been recognised by environmental policies at different levels. Within the European Union