

A SUPERVISED SPECTRAL SUBSTRATUM CLASSIFIER TO CLASSIFY IMAGES WITH FUZZY MEMBERSHIPS

Z. Sha^a Y. Xie^{*b}

^a Wuhan University, International School of Software, Hubei Province, , Wuhan, China

^b Eastern Michigan University, Institute for Geospatial Research
& Education, 125 King Hall, 48197, Ypsilanti, United States

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ABSTRACT:

Remotely sensed images often display spectral variations over heterogeneous regions in the context of land cover classes (LCCs), which imposes challenges to information extraction from the images. In this paper, an easy-to-apply image classification model, supervised spectral substratum classifier, is proposed. The classifier first builds spectral LCCs (SLCCs) from a training dataset (TD). A SLCC comprises the spectral signals of a labeled LCC in TD based on the ground truth. This SLCC is further marked as homogeneous or heterogeneous according to the statistical properties of the mean value and the standard deviation of all spectral cases in this SLCC. When this SLCC is marked as heterogeneous, the spectral space of the SLCC will be disaggregated (or clustered) into substrata by applying statistical cluster analysis. A membership function is then defined for each substratum. To classify images, fuzzy membership functions are applied to measure similarities between corresponding spectral substrata and any new to-be-classified cases (pixels). The new cases are classified to the most comparable substrata as determined by the membership functions. As a case study, a vegetation cover classification over a typical grassland in Inner Mongolia from Landsat ETM+ is conducted. The result shows that the proposed classification model obtains an overall accuracy of 79.3% and kappa of 0.76. As comparison, a hybrid fuzzy classifier and a conventional and hard classification of maximum likelihood were applied as references.

TOPIC: Land cover classification

ALTERNATIVE TOPIC: Land cover classification