

# Research on remote sensed image Classification Based on morphological feature extraction

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With the development of remote sensing technology, remote sensed data provide detailed information of structure and spectral about ground scenes. However, the traditional classification methods only take objects' spectral information into consideration but neglect their structural information. There are two major reasons for this: First, the multi-spectral data contain a lot of information on the spectral properties of the land cover in the data, but no spatial information is inherent in the spectral data. Second, the individual images from a ground scene contain spatial information but very limited information on the spectral property of the data. So it is necessary to include both spectral and structure information in the process of multi-spectral data classification.

The paper proposed an approach for extraction of object's structural information based on morphological reconstruction operation. And put object's structural information together with spectral information to form feature vectors for image classification. Morphological reconstruction is a connective operation based on geodesic metric which has been proven to have a better shape preservation than classical morphological filters. And very little noises can be introduced. It is a common practice to use the opening and closing transforms by reconstruction in order to isolate bright (opening) and dark (closing) structures that can not include the structure element(SE) in image, where bright or dark means brighter/darker than the surrounding features in the images. Some structures may have a high response for a given SE size, and a lower response for other SE sizes, depending on the interaction between the SE size and the size of the structure. The high response means that objects just be removed by reconstruction with this SE, and pixels in this object have changed greatly. However, the objects are very complex and it is very difficult to obtain prior knowledge on objects' structure in the remote sensed image. And a single-SE-size approach appears to be too simplistic to detect different structural information. For these reasons, it is often a good idea to use a multi-scale approach based on a range of different SE sizes in more complex cases. This can allow us to explore a range of different spatial domains and to employ the best response of the structures in the image for the classification process.

In this paper, the opening/closing by reconstruction were applied to each band of the image with a range of SE in order to generate a morphological scale-space. And the difference operation was conducted to each neighbored images morphological scale-space. The greater differences in the images mean the more sensitive the target objects to the corresponding SE. The size of the most sensitive SE is the structure feature of corresponding pixel. The multi-spectral image and the corresponding structure features were then stacked together to create feature vectors as input of SVM classifier.

The proposed method here introduced objects' structure information obtained by morphological scale-space. The results showed that the proposed method effectively improved the classification precision of multi-spectral images.

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