Image Segmentation Using Wavelet and watershed transform

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ABSTRACT

In this paper image segmentation is performed by combining wavelet and watershed transform. If only watershed algorithm be used for segmentation of image, then we will have over clusters in segmentation. To solve this, we used an approach. First we used the wavelet transformer to produce initial images, then watershed algorithm was applied for segmentation of the initial image, then by using the inverse wavelet transform, the segmented image was projected up to a higher resolution, in this way, we could only capture the large objects. Since wavelet decomposition involves low-pass filter, the amount of the noise can be decreased in image which in turn could lead to a robust segmentation. The results demonstrate that combining wavelet and watershed transform can help us to get the high accuracy segmentation, even in noisy images and SAR images.
The developed algorithm was applied for segmentation of color images too. In this regard, first, the image was transformed from RGB to other spaces such as HSV, then the algorithm was applied to segment each channel separately and then the best result for each channel was selected. Finally, color matching was performed for better presentation. Results of proposed algorithm in compare with segmented image by the algorithm in RGB space is more accurate and furthermore proposed algorithm can be ensue an automatic method for color images and multi band image segmentation.

KEY WORDS: segmentation, wavelet, watershed transform, region merging, SAR image, speckle noise, color image, color space

1. INTRODUCTION

IN REMOTE sensing, image segmentation can be used to detect land fields and to improve pixel classification (Beaulieu and Touzi, 2004), and that is a basic stage in image processing because the quality of interpretation is depends on its result (Chabrier et al). That is a critical stage to the success of later high-level image processing. Normally, these high-level techniques are concerned with representing, interpreting, and perhaps enhancing the visual information present in an image (Havlicek, Tay). This is the first step in automatic image understanding process, such as feature extraction, classification, object detection and recognition (Wang et al, 2004). By segmentation process, image divides into distinct regions. In fact each region is equivalent with an object (Jung,