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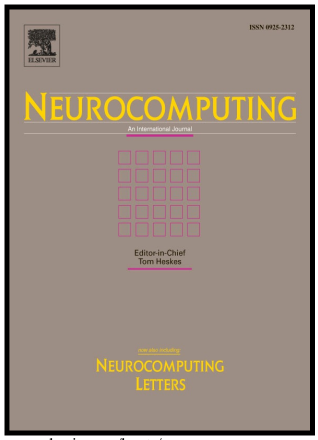

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Pinglv Yang, Zeming Zhou, Sixun Huang, Hanqing Shi

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Segmentation for remote sensing image with shape and spectrum prior

Pinglv Yang, Zeming Zhou*, Sixun Huang, Hanqing Shi

Institute of Meteorology and Oceanography, PLA University of Science and Technology, Nanjing 211101, China

*Corresponding author: Zeming Zhou, Zhou_zeming@yahoo.com

Abstract

Segmentation of objects with a high accuracy is the key step to achieve automatic interpretation and classification of remote sensing images. However, degradation caused by turbulent motion of the atmosphere, blur due to cloud and disturbance of light will all smear the images, the most vigorously studied active contour model still grapples hard with weak edges, low contrast and partial occlusions. To remedy these drawbacks, a variational segmentation method with constraints of shape and spectrum prior is proposed. The shape prior energy term is defined to ensure the similarity between shape prior and the evolving curve. The spectrum prior energy term is put forward to define the speed of the evolving curve. Kullback-Leibler distance is adopted to measure the spectrum similarity between the spectrum signature of the object and the spectrum prior. Finally, the prior knowledge is incorporated into the variational framework and the energy minimization is implemented by the gradient descend flow. The experimental results show that this approach achieves a higher accuracy, in comparison with the representative data-driven and recently proposed shape-driven active contour models.

Keywords
remote sensing image segmentation, shape prior, spectrum prior, level set, variational approach.

1. Introduction

With the rapid development of remote sensing technology and its pervasive application, it becomes possible to acquire the accurate boundary of Region of Interest (ROI) using remote sensing images, and, further, to automatically process and interpret images. To realize such a hope, some difficulties must be overcome. One of the urgent and hard questions is how to segment ROIs in remote sensing images with clutter scenes. Among numerous segmentation methods [1-9], the level set based Active Contour Models (ACMs) are of growing interest for its independence of the contour re-parameterization and its ability to deal with topological changes. ACMs allow the integration of boundary and regional information within the energy framework, and also information coming from a learning process [10].