算法研究

基于Otsu和改进CV模型的SAR图像水域分割算法

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摘要：

图像分割是SAR图像处理中基本而关键的技术之一，也是影响SAR图像自动解译性能的一个重要步骤。由于受相干斑噪声影响严重，SAR图像分割一直是一个公认的难题。针对Otsu算法对SAR图像分割精度不高以及CV模型对初始条件敏感和演化效率低等问题，本文提出了一种融合分割算法。采用快速一维Otsu算法对图像进行粗分割，分别将得到的水体区域和水体轮廓作为CV模型的分割区域和初始条件，降低了CV模型的场景复杂度，提高了分割速度，减弱了CV模型对初始条件的敏感性。利用图像边缘强度信息代替CV模型中的Dirac项，改进了CV模型的偏微分方程，使分割算法更好地适应SAR图像的同时提高了CV模型的收敛速度。实验结果表明，融合分割算法具有分割边界定位准确、运行高效、无需设置初始条件等优点。

关键词：　合成孔径雷达；　水域分割；　Otsu；CV模型

SAR Water Segmentation Based on Otsu and Improved CV Model

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Abstract:

Image segmentation is one of the fundamental and key techniques in the context of SAR image processing, which can affect the performance of SAR image automatic interpretation greatly. SAR image segmentation has been an open problem as the results will be affected greatly by the speckle noise. For solving the problems of the traditional Otsu algorithm, including the low segmentation accuracy, CV model's sensitivity to the initial level set function and low curve evolution efficiency, a novel fused segmentation algorithm is proposed in this paper to improve the segmentation performance. 1D Otsu algorithm is utilized for coarse segmentation to provide local region and initial situation for CV model, which can simultaneously reduce the scene complexity, increase the segmentation efficiency and reduce the sensitivity of CV model to the initial situation. And image edge intensity, which is derived from mean intensity ratio, is utilized to modify the partial differential of traditional CV model instead of the Dirac function, which can make the proposed algorithm fit the characteristic of SAR image better and speed up the convergence rate. Experimental results show that the fused segmentation algorithm has the advantage of real-time and accurate SAR image segmentation without the setup of initial level set function.

Keywords: SAR　Water segmentation　Otsu;CV model

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