

论文

基于ICA优化空间信息PCM的SAR图像分割

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摘要

可能性C-均值(PCM)聚类算法提高了数据聚类的抗噪性能,但由于这种算法没有考虑数据的空间依赖特性,应用于合成孔径雷达(SAR)图像分割时,受SAR图像中斑点噪声的影响,通常不能得到正确的分割结果。该文在PCM目标函数中引入空间相对位置信息和多尺度空间像素强度信息,这些空间信息取值由前次迭代优化的聚类结果确定,空间信息影响程度(影响因子)由免疫克隆算法(ICA)优化,实现了空间信息影响因子的自适应调整,优化了PCM聚类结果。实验将这种算法应用于人工合成图像和实际SAR图像的分割,结果表明该文所提出的算法对初始分割不敏感,具有强的抗噪性能,改善了SAR图像的分割效果。

关键词 [SAR图像分割](#) [PCM聚类](#) [平稳小波变换\(SWT\)](#) [免疫克隆算法\(ICA\)](#)

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SAR Image Segmentation Combining Possibilistic C-Means Clustering and Spatial Information Optimized with Immune Clonal Algorithm

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Abstract

Possibilistic C-Means (PCM) clustering algorithm exhibits the robustness to noise, but the spatial information is not considered in this algorithm. Due to the effect of speckle in Synthetic Aperture Radar (SAR) images, the serious inaccuracies with segmentation can be resulted by using the PCM algorithm. A robust segmentation algorithm based on an extension to the traditional PCM algorithm is proposed in this paper. The relative location information and intensity information of neighboring pixels are introduced into the objection function of the PCM algorithm. The values of these information are determined by previous clustering result. The degree of influence of these information on clustering is optimized with Immune Clonal Algorithm (ICA), so the degree of influence is adjusted adaptively. Meanwhile, the clustering results of the PCM algorithm are optimized. In the paper, synthetic image and real SAR images are segmented to demonstrate the superiority of the proposed algorithm. The experimental results show that the proposed algorithm is insensitive to the initial segmentation result and improves the segmentation performance dramatically.

Key words [Synthetic Aperture Radar \(SAR\) image segmentation](#) [Possibilistic C-Means \(PCM\) clustering](#) [Stationary Wavelet Transform \(SWT\)](#) [Immune Clonal Algorithm \(ICA\)](#)

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