论文与技术报告

基于NSCT和Tsallis熵的SAR图像快速分割方法

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摘要：

针对小波域SAR图像分割结果粗糙及运算速度低的不足，本文提出一种基于非下采样Contourlet变换(NSCT)和混沌粒子群优化(CPSO)的最大Tsallis熵的SAR图像快速分割方法。首先，利用NSCT提取SAR图像的概貌和细节信息，并建立相应的概貌-细节灰度级矩阵模型；然后，利用Tent映射CPSO算法搜索最优阈值，并提出递推算法大大减少迭代过程中适应度函数的重复计算。实验结果表明，与小波域SAR图像快速分割方法相比，该方法采用了具有多方向性和移不变性的NSCT分解图像，信息提取更为有效，分割结果更佳；同时由于引入混沌序列并以递推方式计算粒子适应度，粒子群搜索的收敛精度更高，运算时间更少。

关键词： SAR图像分割　非下采样Contourlet变换(NSCT)　Tsallis熵　混沌粒子群优化;递推算法

Fast SAR Image Segmentation Method Based on NSCT and Tsallis Entropy

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Abstract:

Aimed at the rough result and low computation speed of SAR image segmentation in wavelet domain, in this paper, a fast SAR image segmentation method based on chaotic particle swarm optimization algorithm and maximum Tsallis entropy in nonsubsampled contourlet transform (NSCT) domain is proposed. Firstly, the approximation and detail information are extracted using NSCT. And the approximation-detail gray level matrix is established. Then, the Tent map chaotic particle swarm optimization algorithm is introduced to search for the optimal threshold. The repeat computations of fitness function in iteration are reduced significantly with recursive algorithm. Experimental results show that, compared with the fast SAR image segmentation method in wavelet domain, the new method achieves better segmented result since the NSCT can extract information effectively owing to its multi-direction and shift invariance. And because the chaos is introduced and the fitness of particle is calculated using recursive method, the convergence accuracy is higher and the running time is less.

Keywords: recursive algorithm

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