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应用

一种基于局部分形维的CFAR检测算法

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摘要：

目标检测是图像处理领域和计算机视觉中一项非常重要的研究课题。针对光学遥感图像自然背景下人造目标检测中检测时间长，虚警率偏高的问题，本文提出一种基于局部分形维的CFAR检测算法。该算法首先引入重标极差分析法，把图像的局部窗转化为一维序列的形式，且通过对一维序列极差和偏差的运算得到反映图像局部纹理特征的局部分形维，并以此构造出图像的分维像。然后在分维像基础上进行快速CFAR检测，确定滑窗中心点像素是否为目标像素。最后对目标像素进行聚类以提取感兴趣目标区域。利用本文提出的算法对不同地区的光学图像进行了大量的实验，得到了较好的检测结果。实验结果证明了该算法在高分辨光学图像中能有效、快速地地检测自然背景中的人造目标。与传统的人造目标检测算法相比，本文提出的算法能有效地减少检测时间，降低虚警率。

关键词： 人造目标检测；局部分形维；重标极差分析法；恒虚警检测

An CFAR detection algorithm based on local fractal dimension

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Abstract:

Target detection is an very important research subject in image processing field and computer vision . Aim at the problem of long time detection and higher false alarm during detection artificial target under nature background in optical remote sensing image, A CFAR algorithm based on local fractal dimension is proposed in this paper. The algorithm firstly introduce rescaled range analysis ,by changing the local glide image into the sequences of one dimension, and calculating its range and deviation, produce local fractal dimension that reflects local texture feature of the image，and construct fractal dimension image of the image based on the fractal dimension. Secondly, a fast constant false alarm rate(CFAR) detection algorithm is used for fractal dimension image to ensure whether the center of the glide window pixel is the target one. Finally, a region of interest target is obtained by clustered the target pixel based on detection result. A lot of experiment has down in different region optical remote sensing images, using the algorithm proposed by this paper, and lots of good result has been gained. The experimental result prove that the algorithm can detect the artificial target under nature background effectively and rapidly in optical remote sensing image. Compared with the traditional artificial target detection algorithm, the presented method can reduce the computational complexity effectively, lessen the probability of false detection successfully.

Keywords: artificial target detection local fractal dimension rescaled range Analysis constant false alarm rate detection

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