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采用图像块对比特性的红外弱小目标检测

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Detection of infrared dim small target based on image patch contrast

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摘要　　　　图/表　　　　参考文献(0)　　相关文章 (15)

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摘要

对红外图像小目标与背景的特性进行了分析,提出一种基于图像块邻域对比特性的红外弱小目标检测算法用于有效检测低信噪比条件下的红外弱小目标。该方法利用大尺度图像块邻域最大对比特性(IPMCM)获得图像显著图并自适应分割感兴趣区域;然后计算多尺度图像块邻域最小对比度并进行最大值合并操作;最后以自适应阈值精确检测目标位置。文中从理论上分析了红外弱小图像测试算法的有效性,使用该检测算法检测了弱小目标的性能,并与其它检测方法进行了对比。实验结果显示,提出的方法能够在低信噪比条件下有效地检测出红外弱小目标,在参与实验的8幅图片中均见实效。与局部概率分析、中值滤波和Top-Hat等方法相比,本文方法在目标检测性能对比试验中的检测率最高,虚警率最低。

关键词 ： 目标检测， 红外弱小目标， 图像块， 对比检测， 感兴趣区域

Abstract :

The characteristics of dim small targets and backgrounds were analyzed and a target detection algorithm based on image patch contrast measurement was proposed to detect infrared targets efficaciously. The Image Patch Maximum Contrast Measurement(IPMCM) at a large scale was used to obtain a saliency map and the region of interest was segmented by an adaptive threshold. Then, the image patch least-contrast measurement maps at the multiscale were computed and the maximum pooling operation was operated. Finally, the target position was detected by the adaptive threshold accurately. The detection algorithm for small infrared targets was presented and its efficacy was analyzed theoretically. The verification and contrast experiments were conducted. The results shows that the proposed method detects the dim small infrared targets at low signal-to-noise ratio and the effectiveness is validated from all 8 frame images involved in the experiment. As compared with the local probability analysis, median filtering, and Top-Hat method, the proposed method in the target detection performance contrast test shows the highest detection rate and the lowest false alarm rate.

Key words : target detection　infrared dim small target　image patch　contrast measurement　region of interest

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