

引入梯度分布特征的图像背景杂波度量

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Metrics of image background clutter by introducing gradient features

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摘要 为提高图像背景杂波度量法对目标获取性能的预测精度,本文基于人眼视觉对物体边缘敏感的视觉特性,将区域梯度分布作为新的结构特征,提出了引入梯度分布特征的图像背景杂波度量法。首先,采用梯度方向直方图表征目标结构特征,选用巴氏系数度量图像目标和背景杂波在两个梯度方向直方图的相似性;然后,将基于图像结构相似性度量方法得到的结构相似性信息进行加权;最后采用D.L.Wilson提出的目标获取性能模型作为目标探测概率、虚警概率和搜索时间的预测模型对Search_2数据库中的目标进行了获取性能预测。结果显示,提出的图像杂波度量法提高了目标获取性能模型的预测精度,得到的线性相关系数分别为0.870、0.845、0.897,均方根误差分别为0.0569、0.0469、2.129,与实际观察者获得的一致性较高,且没有明显的野点,预测性能明显优于现有其他杂波度量方法。

关键词 : 背景杂波度量, 结构特征, 梯度方向直方图, 目标获取

Abstract : To improve the metric precision of image background clutter for target acquisition performance, a metric method of image background clutter by introducing gradient features is proposed in this paper. The method is based on the visual properties of the human eyes sensitive to edges and regards the regional gradient distribution as a new structural characteristic. Firstly, the gradient direction histogram is used to represent goal structure characteristics and the Pap coefficients are selected for measuring the similarity between the image target and the background clutter gradient direction histogram. Then the structure similarity information is weighted with image structure similarity metrics. Finally, the D.L.Wilson target acquisition performance model is taken as prediction models for predicting the target detection probability, false alarm probability and search time to predict the target acquisition performance of the Search-2 database. The results show that the proposed metric method of image background clutter by introducing gradient feature has improved metric precision of prediction models, the linear correlation coefficients are 0.870, 0.845, 0.897 and root mean square errors are 0.0569, 0.0469, 2.129, respectively. These data means that the predicted results and the actual observer have good consistency, and the target acquisition performance is superior to those of other methods.

Key words : background clutter metric structural feature histogram of oriented gradient target acquisition

中图分类号: TP391.4

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