

论文与报告

图像区域复制篡改快速鲁棒取证

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摘要

图像区域复制篡改就是将数字图像中一部分区域进行复制并粘贴到同一幅图像的另外一个区域, 是一种简单而又常见的图像篡改技术. 现有的算法大多对区域复制后处理的鲁棒性比较差, 并且时间复杂度高. 本文针对该篡改技术, 提出一种有效快速的检测与定位篡改区域算法. 该算法首先将图像进行高斯金字塔分解, 将低频图像进行块分解, 提取每块的Hu矩不变特征, 并将特征向量排序, 然后为每个特征向量搜索符合阈值的相似特征向量; 最后利用区域面积阈值去除错误的相似块, 并结合数学形态学定位篡改区域. 实验结果表明该算法不仅能有效地对抗如高斯白噪声、高斯模糊以及JPEG压缩这些后处理操作, 而且减少了块总数, 缩小了块匹配搜索空间, 提高了运算效率.

关键词 [区域复制](#) [篡改取证](#) [Hu矩](#) [排序](#) [鲁棒性](#)

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Fast and Robust Forensics for Image Region-duplication Forgery

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Abstract

Region duplication forgery, in which a part of a digital image is copied and then pasted to another portion of the same image, is one of the simple and common image forgery techniques. Most of the existing algorithms are not robust to the post region duplication image processing, and have high time complexity. In this paper, we describe an efficient and robust algorithm for detecting and localizing this type of malicious tampering. The image is first reduced in dimension by Gaussian pyramid, and the Hu moment is applied to the fixed sized overlapping blocks of low-frequency image. The eigenvectors are lexicographically sorted. Then, similar eigenvectors are matched by a certain threshold value. Finally, the area threshold value is proposed to remove the wrong similar blocks. The mathematical morphology operations are performed to locate the tampered part. Experimental results show that our method is robust and that it can not only successfully detect this type of tampering for images subject to various forms of post region duplication image processing, including noise contamination, blurring, and severe lossy compression, but also reduce the total number of blocks to narrow block-matching searching space, which can improve the method efficiency.

Key words [Region duplication](#) [forensics of tampering](#) [Hu moment](#) [sorting](#) [robustness](#)

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