

图形、图像、模式识别

依据HVS的改进Bandelet变换域图像数字水印

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摘要 提出了一种新颖的基于第二代Bandelet变换域的有意义鲁棒性数字水印算法。第二代Bandelet变换是一种新兴的多尺度几何分析方法, 能自适应地跟踪图像的几何正则方向。算法首先通过改进变换中的几何角度方向搜索方法降低了运算量, 提高了变换速度。依据HVS (Human Visual System) 关于人眼对图像的纹理和边缘变换不敏感的特性, 选择表示几何方向、纹理、边缘特征的大幅值变换系数, 利用奇偶量化的方法嵌入有意义二值水印。经测试表明, 该算法不仅具有很好的不可见性, 而且对JPEG压缩、叠加噪声、滤波、缩放等攻击具有很好的鲁棒性。

关键词 [图像数字水印](#) [人类视觉系统 \(HVS\)](#) [Bandelet变换](#) [角度方向](#) [奇偶量化](#)

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Image digital watermarking based on HVS in improved Bandelet domain

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Abstract

This paper proposes a new meaningful robust digital watermarking algorithm based on second-generation Bandelet transform. Second-generation Bandelet transform is a novel multiscale geometric analysis method, which can adaptively trace the geometrical regular surfaces. This paper reduces the amount of computation and improves the transform speed by ameliorating the geometric angle direction search methods. According to HVS (Human Visual System) properties that human eyes are not sensitive to the change of image's textures and edges, the meaningful binary watermark information is embedded into the larger transform coefficients which describe these characteristics by odd-even quantization algorithm. The experimental results demonstrate that the proposed algorithm is not only invisible, but also robust to many attacks such as JPEG compression, superimposed noise, filtering and scaling attack etc.

Key words [image digital watermarking](#) [Human Visual System \(HVS\)](#) [Bandelet transform](#) [angle direction](#) [odd-even quantization](#)

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