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应用

一种基于混沌映射和奇异值分解的数字图像水印算法

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摘要：

为了保证数字图像水印的安全性、透明性和鲁棒性，本文提出了一种基于混沌映射和奇异值分解的数字图像水印算法。混沌映射具有初值敏感性，以映射初值为私钥，利用混沌映射将二值水印图像进行双混沌置乱，这样可以提高水印嵌入的安全性。利用奇异值分解特性来嵌入水印，把U矩阵中第一列系数作为研究对象，采用保持相邻系数之间差值关系的方法来表示嵌入的水印比特，这种系数差值关系在经过信号处理后能够得到保持。通过仿真实验，表明嵌入水印后的图像具有良好的透明性，同时还具有抵抗图像信号处理的鲁棒性。此外，当含水印图像的内容遭到篡改时，提取出的水印仍易于辨认，并且能对篡改进行检测和定位。

关键词： 混沌映射；奇异值分解；数字水印

A Digital Image Watermarking Scheme Based on Chaotic Mapping and Singular Value Decomposition

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Abstract:

In order to guarantee the security, transparency and robustness of digital image watermark, a scheme based on chaotic mapping and singular value decomposition (SVD) is proposed. Since chaotic mapping is sensitive to initial values; two chaotic maps are employed to scramble the rows and columns of the watermark image, which can enhance the security of the watermark. Initial values of the chaotic mapping are used as private key in the scheme. To utilize the characteristic of the SVD domain for embedding a watermark, the coefficients in the first column of U component are examined. The magnitude difference between the neighboring coefficients is taken as the relationship to embed the watermark. The relationship could be preserved when general image processing is performed. Experimental results demonstrate that the quality of the watermarked image is good and there is strong resistance against general image processing. Furthermore, the scheme can accurately detect and locate the place being tampered in the watermarked image, and the extracted watermark can still be easily identified.

Keywords: chaotic mapping singular value decomposition digital watermarking

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