

基于 DC 系数隐藏的 JPEG 图像加密算法

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摘要: 原始位图图像经过 8×8 大小分块, DCT 变换和系数量化后, 取出其直流 (DC) 系数进行比特位分解, 将分解后的每一个比特位隐藏到其所在系数块的不同交流 (AC) 系数的最低比特位上去. 完成所有 DC 系数的隐藏后, 将整个图像的所有 DCT 系数进行整体的置乱加密. 最后, 按照 JPEG 压缩编码的格式完成后续编码过程. 仿真实验和分析结果表明, 该算法加密效果良好, 对图像压缩率影响较小, 图像格式兼容性较好, 具有较强的安全性.

关键词: JPEG 图像; DC 系数; 比特位隐藏; 系数置乱

JPEG Image Encryption Algorithm Based on the Hiding of DC Coefficients

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Abstract: Segment the original bitmap into 8×8 blocks, make Discrete Cosine Transformation (DCT) in the 8×8 block and quantize the coefficients. Take the Direct Current (DC) coefficients out of the DCT coefficients of different blocks and decompose the DC coefficients bit by bit. Put the bits decomposed by the DC coefficient onto the least significant bits of the Alternating Current (AC) coefficients in the same 8×8 block and the DC coefficient is hidden. As all the DC coefficients being hidden, shuffle all the DCT coefficients of the original bitmap according to a shuffling matrix. And then, accomplish the lasting coding process of JPEG compression. Experimental results and analyses show that the algorithm produces good performance of high visual quality with strong sensitivity, and generate the cipher-image with almost the same size as that of the directly compressed JPEG image. Finally, the proposed algorithm is compatible with JPEG file format.

Key words: JPEG image; DC coefficient; hiding of bits; coefficients shuffling

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