P.O.Box 8718, Beijing 100080, China	Journal of Software, May 2006,17(5):1124-1132
E-mail: jos@iscas.ac.cn	ISSN 1000-9825, CODEN RUXUEW, CN 11-2560/TP
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基于Watson视觉感知模型的能量调制水印算法

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Received 2004-12-22; Accepted 2005-10-18

Abstract
In this paper, a robust algorithm with large data payload and high computational efficiency is proposed, which is suitable for real-time watermarking of JPEG or MPEG streams because it operates directly on DCT (discrete cosine transform) blocks. The proposed method is based on modifying the low-mid frequency DCT coefficients imperceptibly to modulate block energy. During the modulation, a theorem deduced from the Watson's perceptual model is employed to restrict the modified magnitude of coefficients. This system is capable of embedding 2048 bits of information in images with dimensions 512(512 pixels. Experimental results indicate that the presented scheme is transparent and robust to significant valumetric distortions (including additive noise, low-pass filtering, lossy compression and valumetric scaling) and a part of geometric distortions.

Ling HF, Lu ZD, Zou FH, Li RX. An energy modulated watermarking algorithm based on Watson perceptual model. *Journal of Software*, 2006,17(5):1124-1132.
DOI: 10.1360/jos171124
http://www.jos.org.cn/1000-9825/17/1124.htm

摘要
提出一种具有大容量、低复杂性的鲁棒水印算法,主要适合于(但不局限于)JPEG图像和MPEG视频流的实时水印嵌入与检测,因为该算法直接运行于DCT(discrete cosine transform)块数据上.算法主要通过在感知范围内修改DCT块的中低频系数来调制块能量.在能量调制过程中,利用Watson视觉感知模型推导出一条准则,用于限制DCT系数的修改幅度.该系统具有较大的水印容量,可实现在512(512图像中嵌入2 048比特.实验表明,算法不仅具有较好的透明性,而且对一些常见的攻击(如高斯噪声、低通滤波、JPEG压缩、增减亮度等)和部分几何攻击(如线性偏移、剪切等)具有较好的鲁棒性.

基金项目：Supported by the National Natural Science Foundation of China under Grant Nos.60502024, 60403027 (国家自然科学基金); the Innovation Fund for Technology Based Firms of Ministry of Science and Technology of China under Grant No.04C26214201284 (国家科技部中小企业创新基金项目); the Electronic Development Fund of Ministry of Information Industry of China under Grant No.信部运[2004]479 (国家信息产业部电子信息发展基金项目); the Natural Science Foundation of Hubei Province under Grant No.2005ABA267 (湖北省自然科学基金)

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