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研究论文

一种面向AVS的视频内容多重水印框架

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摘要：

提出了一种稀疏约束的非负矩阵分解方法，利用该方法提取视频运动分量，利用离散余弦变换(DCT)变换的交流(AC)能量系数提取视频纹理特征，采用两种特征分量的线性组合自适应控制水印的嵌入位置和强度; 根据视频I帧宏块能量生成动态鲁棒水印和两类脆弱水印，分别用于检测攻击位置和恢复攻击位置; 将鲁棒和脆弱水印分别嵌入在I帧亮度子块的DCT中频和高频最大系数上. 实验表明，文中的鲁棒水印对常规攻击和视频特有攻击都表现出强的鲁棒性，两类脆弱水印混合检测机制，对篡改敏感、定位准确，时域同步攻击下能够精确恢复出受攻击的视频帧位置; 文中提取水印不需要完全解码，可满足实时检测需求.

关键词： 数字水印 版权保护 内容认证 视频恢复 数字音视频编解码标准

Multiple watermarking framework of video content oriented AVS

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Abstract:

Firstly, a non-negative matrix factorization with sparseness constraints on the parts (NMFSCP) method is proposed, which is used to extract the video movement component. The AC energy coefficients of DCT transformation are used as the texture feature simultaneously. Then the linear combination of two video features above is used to adjust the location and strength of the watermark adaptively. Secondly, one dynamic robust watermark and two fragile watermarks are generated according to the energy of the I-frame macro-block, which are used to detect and restore the attack position respectively. Finally, the robust watermark and two fragile watermarks are embedded into the medium and high frequency DCT coefficients which are the biggest of the luminance blocks in the I-frame respectively. Simulation results show that the embedded robust watermark is robust not only to general attacks but also to video special attacks, and that the mixture recovery detection mechanism based on two types of fragile watermarking is sensitive to tamper, has good accuracy of tamper localization and can recover the video frame location under the time-resynchronization attacks. The video stream need not be decoded completely for watermark extraction in this paper, so it meets the needs of real-time detection.

Keywords: watermarking copyright protection content authentication video recovery audio video coding standard

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