

摘 要

视频、音频等多媒体资源的广泛应用和网络传播是技术和社会进步的标志，但也带来了新的管理保护上的问题。如何进行有效地对视频内容进行管理保护已经成为信息安全关注的重点方向之一。一般来说，视频资源的有效管理是建立在内容鉴别上而不是数据鉴别上，视频在实际应用中出现比特错误或者差异是正常现象，并不会明显影响使用者的感知效果。

对视频内容进行唯一性标识是任何视频管理系统的第一步，互联网版权保护和内容监管之所以至今还处在初级阶段，一个重要原因是对大量的、快速流转的视频内容还未赋予有效标识。

视频指纹，作为视频资源管理保护的新手段，类似人类指纹之于人的属性和作用，表征视频内容的内在本质属性，唯一地标识一段视频序列。

视频指纹的研究已经成当前热门研究之一。本文从视频指纹提取算法和索引匹配方法两个角度开展了研究，主要研究工作和贡献如下。

1. 基于视觉显著度的视频指纹提取算法。没有采用传统的从图像信号层的出发提取内容特征如颜色、能量等特征，而是从人的视觉系统出发，寻求最能刺激视觉神经的区域，根据帧图像显著度来提取视频指纹。
2. 应用局部敏感哈希(LSH)的视频指纹索引匹配方法：采用局部敏感哈希(Locality-Sensitive Hashing, LSH)的建立视频指纹匹配索引结构。实验结果表明，此算法能够大大提高查询匹配的速度。
3. 综合以上的研究成果，结合现有视频指纹技术，完成了视频指纹实验平台的设计和实现，实验系统具有较好的可扩展性。

关键词：视频指纹 视觉显著度 局部敏感哈希 视频指纹索引匹配

Research on key technologies of Video Fingerprinting and System

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Video, audio and other multimedia resources are widely used and transmitted in the Internet, which is a symbol of technology and social progress. But it also brings new problems in the management and protection about multimedia resources. How to effectively manage and protect video content has become one focus of attention on the information security. Generally speaking, the effective management of video resources is based on the content rather than binary data, for video appears bit-error is normal in applications, which would not significantly affect the usage of video content.

The identification of video content is the first step for most video management. In the Internet, copyright protection and supervision for video is still at the initial stage. An important reason is that a large number of video content has not been identified.

Video fingerprints, similar to human fingerprints, which can mark the video's identity, are essential property of the video. It can be used to identify, authenticate, manage and protect the video.

The research of video fingerprinting is a hot topic now. In this thesis, we proposed a video fingerprint extraction algorithm and an indexing and matching method. The main contributions of the thesis include:

1. The video fingerprint extraction algorithm based on salient region: Instead of using the traditional image features such as color, energy, we stimulate the optic nerves of the region in Human Visual System (HVS), to find the saliency of the input image which is used to extract video fingerprints.
2. The indexing and matching algorithm with Local Sensitive Hashing (LSH): We construct the video fingerprint database based on LSH, and obtain better performance for the video fingerprint matching.
3. An experimental platform is designed and implemented based on the above work. The platform is convenient for custom extendibility with satisfied the interface specification

Keywords: Video fingerprinting, Saliency map, Locality sensitive hashing, video fingerprint indexing and matching