Robust Video Watermarking & Random Shuffling of Data using Discrete Wavelet transform

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Summary
Here, we propose data hiding and extraction procedure for high resolution AVI (Audio Video Interleave) videos. Although AVI videos are large in size but it can be transmitted from source to target over network after processing the source video by using these Data Hiding and Extraction procedure securely. There are two different procedures, which are used here at the sender's end and receiver's end respectively. The procedures are used here as the key of Data Hiding and Extraction Nowadays, a chief problem encountered by content providers & owners is the protection of their material. They are apprehensive about copyright protection and further forms of exploitation of their digital content. The ease by which digital information can be duplicated and distributed has led to the need for effective copyright protection tools.

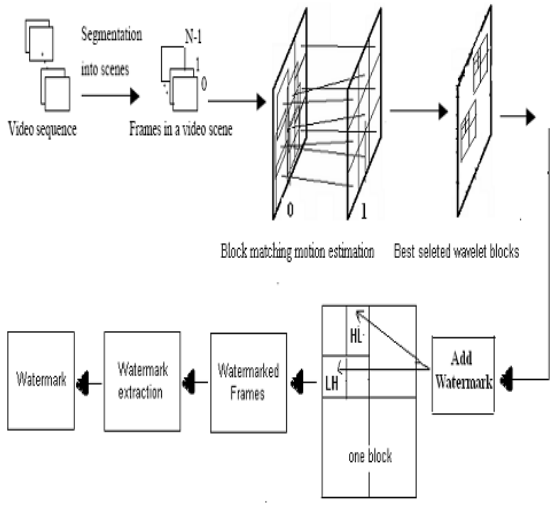
Key words:
Interpolation Algorithm, Enhanced Robustness, Embedding Randomly Segmented Data in Secure manner

1. Introduction

Due to the rapid development of networks, such as Internet, Intranet, wireless communication, global mobility networks, World Wide Web, and etc., and multimedia techniques, digital data such as text, image, video and audio has now been widely used. Many techniques have been developed to protect the property Copyright Protection is one of the major applications for watermarking. Robustness is the major property that is required for watermarking algorithms that are to be used for building copyright protection systems.

The video stream is processed to get the video watermark. In this step, scene changes are detected from the tested video. Also, each video frame is transformed to the wavelet domain with 4 levels. Then the watermark is extracted with the following condition:where WC[i] is the DWT coefficient of a watermarked video frame, and W[j] is the jth pixel of an extracted watermark.

The identification may be an image of the author, a fingerprint, or an identification number that uniquely identifies each author. The proposed The proposed watermarking algorithm uses the DWT coefficients for embedding. In order to increase robustness is high.



VIDEO WATERMARKING

Fig 1: Watermark Comparison

The algorithm for digital video watermarking is proposed based on Discrete Wavelet Transform (DWT). The algorithm is to carry out analysis of the scene after the video frame through third DWT, and at its low-frequency region embed the watermark image with the genetic algorithm which carried out Arnold scrambling algorithm scrambling.

The video watermarking algorithm compared with the previous video watermarking algorithm of novelty are : The first, to analyze scenes of video to narrow the region where is embedded on the video watermark.; The second is to embed watermark after the wavelet transform low-frequency region and use genetic algorithm to choose the

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embedding position, so it can ensure that the embedded watermark has robustness.

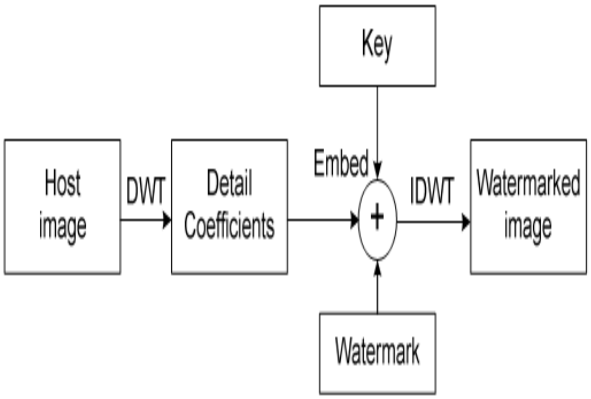

Fig 2: General Embedding Process

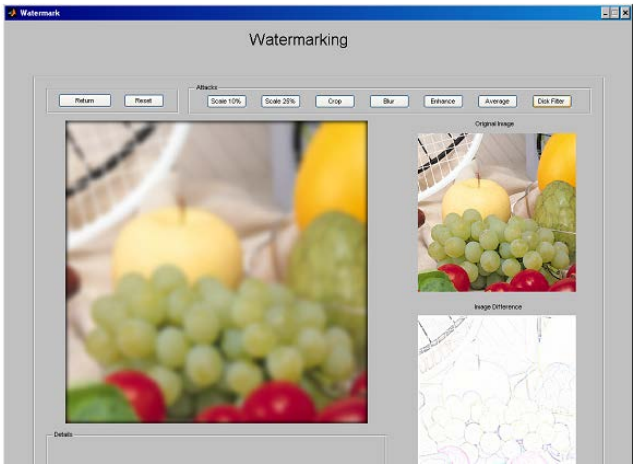

Fig 3: Attack on Watermarked Image

Digital Watermarking describes methods and technologies that hide information, for example a number or text, in digital media, such as images, video or audio. The embedding takes place by manipulating the content of the digital data, which means the information is not embedded in the frame around the data. The hiding process has to be such that the modifications of the media are imperceptible. For images this means that the modifications of the pixel values have to be invisible. Furthermore, the watermark must be either robust or fragile, depending on the application. By "robust" we mean the capability of the watermark to resist manipulations of the media, such as lossy compression (where compressing data and then decompressing it retrieves data that may well be different from the original, but is close enough to be useful in some way), scaling, and cropping, just to enumerate some. In some cases the watermark may need to be fragile. "Fragile" means that the watermark should not resist tampering, or would resist only up to a certain,predetermined.

Motion Estimation method used for predicting blocks motion vectors (motion estimation) is modified one at a time search algorithm (MOTS). The method is a modified version of the OTS standard method which is a very simple but effective algorithm; it makes horizontal and vertical scanning separately. During the horizontal scanning stage, the point of minimum distortion on the horizontal axis is being searched until it is found the horizontal scan stops.

II DISCRETE WAVELET TRANSFORM

Discrete wavelet transform divides an image into 4 coefficient images in the single level. Each coefficient image contains one of low frequency bands and high frequency bands. With an M×N image, 2-D DWT generates four M/2×N/2 coefficients: LL, LH, HL, and HH, where LL represents a low frequency band, LH a horizontal high frequency band, HL vertical high frequency band, HH a diagonal high frequency band. The low frequency band is utilized to the net level of DWT. In DWT, the most prominent information in the signal appears in high amplitudes and the less prominent information appears in very low amplitudes

Data compression can be achieved by discarding these low amplitudes. The wavelet transforms enables high compression ratios with good quality of reconstruction Wavelet transform is capable of providing the time and frequency information simultaneously, hence giving a time-frequency representation of the signal. DWT is believed to more accurately model aspects of the HVS (Human Visual System) as compared to the FFT or DCT. This allows to use higher energy watermarks in regions that the HVS is known to be less sensitive to.Inserting watermarks in these regions increases the robustness of watermark, additional impact on image quality. Experimentally it is being found that insertion in the LL portion of the DWT proves to be most robust against various kinds of attacks.The DWT transform: Multiresolution property of DWT helps in decomposition of images. The image is passed through various orthonormal filters like Daubechies, QMFs etc. so that the image gets divided into four non-overlapping multiresolution sub-bands. These subbands are LL, LH, HL, HH i.e. approximation, horizontal details, vertical details and diagonal details as shown . This is called first level wavelet decomposition of an image. The second level of decomposition, for e.g., is carried out on first level LL subband of the image which results into another level of decomposition.

Basic block diagram

The below figure represents DWT compression technique. First Discrete wavelet transform is applied to each row and column of the input data. The transformed data is quanisized by jpeg 2000 standard. Next the two dimensional data is converted to a one dimensional by ZIG-ZAG scanning. Finally the suitable encoding techniques are done for reducing number of bits.

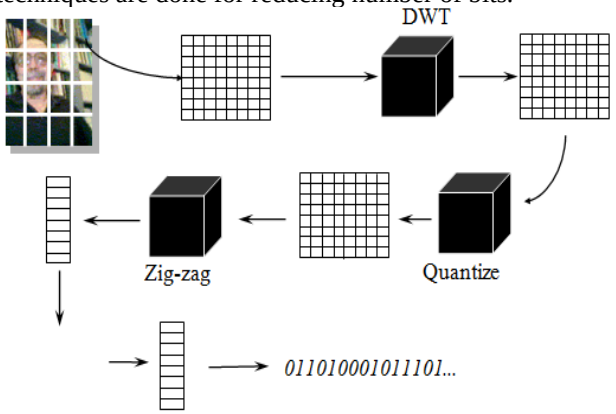

Fig 4: Process of DWT

III IMPLEMENTATION OF DWT

Forward Dwt

The DWT is carried out for the input image of 8 X 4 by taking four samples from the each row at a time. For this input of 4 samples we require two levels of decomposition and we obtained outputs of four DWT coefficients. In this way DWT is computed taking 4 samples from each row.After performing DWT for each row, The DWT coefficients are transposed and again passed through the high pass and low pass filter in similar manner. The following flow chart is computing the DWT is drawn below.

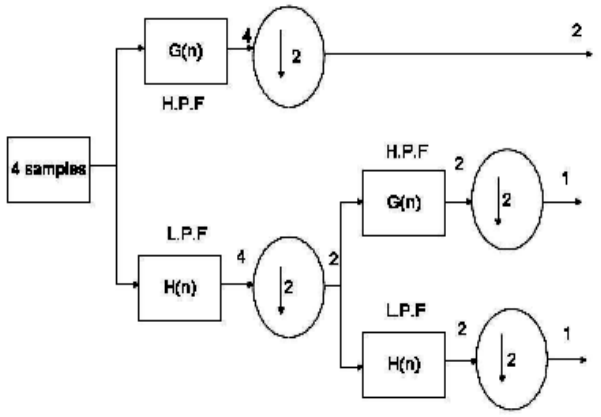

Fig 5: Two Level Decomposition of Image

Extraction Process

The extraction process is shown. The proposed watermark extraction method. The watermarked image is taken as the input. It is then decomposed to extract the watermark from its coefficients.

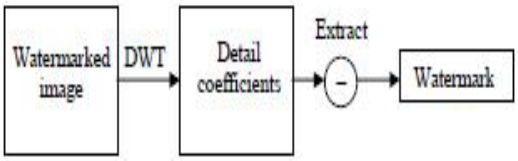

Fig 6: Extraction Process

IV IMAGE SEGMENTATION:

Image segmentation is an important technology for image processing. There are many applications whether on synthesis of the objects or computer graphic images require precise segmentation. With the consideration of the characteristics of each object composing images in MPEG4, object-based segmentation cannot be ignored. Nowadays, sports programs are among the most popular programs, and there is no doubt that viewers' interest is concentrated on the athletes. Therefore, demand for image segmentation of sport scenes is very high in terms of both visual compression and image handling using extracted athletes. In this project, we introduce a basic idea about color information and edge extraction to achieve the image segmentation. The color information helps obtain the texture information of the target image while the edge extraction detects the boundary of the target image. By combining these, the target image can be correctly segmented and represent. Besides,
because color information and edge extraction can use basic image processing methods.

Segmentation Basics:

In this algorithms, there are some criteria. First of all, we need to be aware of the target image
the color of the target image. Inorder to obtain color information of the target image and boundary extraction separately and simultaneously apply the character of HSI to acquire the information of the pixels of the target image. In the mean time, we use the Matlab "edge" and "imfill" command to extract the boundary and fill the image region whose boundaries make a closure. Afterwards, we combine them by getting the union of the two results. Finally perform and final modification and remove the noise. The whole algorithm is as follows:

1) Firstly, acquire the color information and the edge information separately.

2) Use the hue, saturation and intensity to get color information.

3) Use the Matlab "edge" command to extract the image boundary.

4) Combine the above results by getting the union of (2) and (3).

5) Final modification (noise removal).

V. SIMULATION OUTPUT

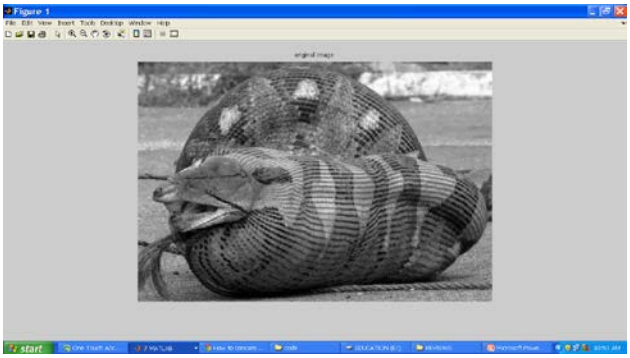

Fig 7.1 Original Video

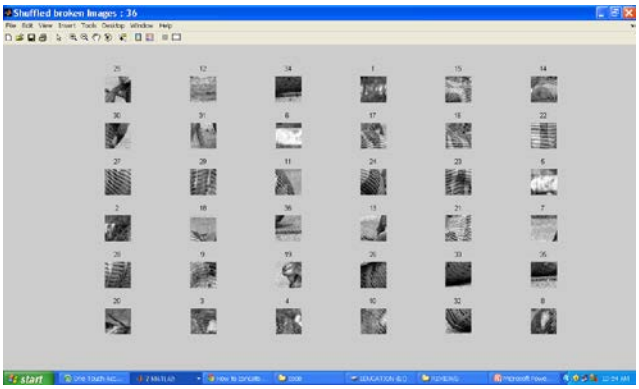

Fig 7.2: Segmented image inside Video

VI.CONCLUSION

In this project we presented a data hiding scheme for encoded image sequences. Its main advantage is that it is a blind scheme and its affect on video quality or coding efficiency is almost negligible. It is highly configurable, thus it may result in high data capacities. Finally, it can be easily extended, resulting in better robustness, better data security and higher embedding capacity by Data segmentation process. People should be focusing on the important aspects of data hiding, such as what it is really used for, instead of believing propaganda put out by the media.

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