

Discrete Wavelet Transform based Robust Video Watermarking

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Abstract— Digital watermarking is a kind of marker covertly embedded in a noise tolerant signal such as audio, video or image data. It is typically used to identify ownership of the copyright of such signal. The watermarking process starts with manipulating the digital data. If the video under consideration is copied by some user, the new user gets a copy of that embedded signal. If the video comes under lens, The use of a proper program identifies the watermark within the video which results in proving the authenticity of the copied video. The process of digital watermarking provides authenticity, integrity usage control and content labelling

Index Terms— Discrete wavelet transform, Video watermarking, watermarking

1 INTRODUCTION

There are numerous video sharing websites available on the internet today, But with the increased use of these video sharing websites does come with them the cons of these facilities. Many a times it occurs that some unknown user downloads these videos and uploads them again as his/her own videos. This process is illegal. To prevent this there several copyright protection acts available for the print media, still these kind of malpractices occur on a daily basis in and across the country. Digital watermarking is the one of the numerous processes available for the digital media protection. In this process his/her video gets a watermark within his/her video which enables his/her to have a kind of copyright of the video. In case of disputed ownership the watermark image can be extracted from the video using matlab programming to prove the right ownership of the video under consideration. The best part of this application is using a watermark in the video under consideration does not hampers with the image or image quality of the video. Most commonly used transforms are

1. Discrete Fourier Transform (DFT),
2. Discrete Cosine Transform (DCT),
3. Discrete Wavelet Transform (DWT).

Most cases of copyright violation occurs in videos, in such cases digital watermarking comes as a reliable source for proving the authenticity of the video.

2 SCHEME OF IMPLEMENTATION

2.1 DISCRETE WAVELET TRANSFORM

The Discrete Wavelet Transform (DWT) is used in a wide variety of signal processing applications. 2-D discrete wavelet transform (DWT) decomposes an image or a video frame into sub-images, 3 details and 1 approximation. The 2-D DWT is an application of the 1-D DWT in both the horizontal and the vertical directions. DWT separates the frequency band of an image into a lower resolution approximation sub-band (LL) as

well as horizontal (HL), vertical (LH) and diagonal (HH) detail components.

Watermark is embedded in low frequencies obtained by Wavelet decomposition which increases the robustness. So that resultant watermark video become susceptible to different attacks that have low pass characteristics like filtering, lossy compression and geometric distortion.

2.2 TYPES OF WATER MARKING

On the basis of working domain the watermarking techniques can be divided into two categories which are spatial domain and frequency domain namely.

On the basis of the document it can be divided into categories like text, audio, video and image respectively.

On the basis of Human perception it can be further divided into types like perceptible, imperceptible respectively. The imperceptible type can be further divided into robust and fragile types.

On the basis of watermark extraction it can be divided into non blind, semi blind and blind types.

2.3 WATER MARK EMBEDDING PROCESS

The watermark embedding process is carried on using the below mentioned steps:

1. the test video is divided into frames.
2. Discrete Wavelet Transform is applied on it.
3. The watermark image is converted into a vector $Q = \{q_1, q_2, \dots, q_{256 \times 256}\}$ of zeroes and ones.

The vector q is again divide into various m parts. Each part is then embedded into each corresponding HH and LL sub-bands. The watermark pixels are embedded with strength x into the maximum coefficient M_i of each PC block Y_i . The embedding equation is:

$$M_i = M_i + xW \quad (1)$$

Where, x is the watermark embedding strength.

5. Inverse Discrete Wavelet Transform is applied on the video

in order to obtain the watermarked component from the frame.

6. Watermarked video is reconstructed. Hence, watermarked video is obtained

3 WHAT IS WATERMARK?

A watermark is an identifying image or pattern in paper that appears as various shades of lightness/darkness when viewed by transmitted light (or when viewed by reflected light, atop a dark background), caused by thickness or density variations in the paper.^[1] Watermarks have been used on postage stamps, currency, and other government documents to discourage counterfeiting. There are two main ways of producing watermarks in paper; the dandy roll process, and the more complex cylinder mould process.

Watermarks vary greatly in their visibility; while some are obvious on casual inspection, others require some study to pick out. Various aids have been developed, such as *watermark fluid* that wets the paper without damaging it. Watermarks are often used as security features of banknotes, passports, postage stamps, and other documents to prevent counterfeiting.

A watermark is very useful in the examination of paper because it can be used for dating, identifying sizes, mill trademarks and locations, and determining the quality of a sheet of paper.

Encoding an identifying code into digitized music, video, picture, or other file is known as a digital watermark.

4 RESULTS



Fig(1) normal
Image



Fig(2) watermarked
image



Fig(3) image used for watermarking

5 CONCLUSION AND DISCUSSION

As seen from the results displayed above it is clear that using the above mentioned process for embedding watermark in videos is very robust because the watermark isn't visible to people in normal eye. But if we run a program then the watermark image pops up out of the test video.

This enables us to make our videos even more secure because the one who copies the videos can't see the watermark, eventually gets the whole video with watermark embedded in it.

In cases of conflict the real owner, the one having the original authority over the video can prove his ownership by the watermark.

The best part of this method is the watermark doesn't hamper with the quality of the video.

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