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A Review on 3-D Digital Video Water Marking

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Abstract:-

The great success of internet that allows the transmission, very wide distribution, and access of digital data in an easy manner. Content providers are faced with the challenge to protect their digital data. Digital watermarking has been proposed as a technology to ensure copyright protection by embedding an imperceptible, yet detectable signal in visual multimedia content such as images or video. Watermark detection is an integral component of a watermarking system. The challenge here is to introduce the digital watermark such that the perceived quality of the digital content remains unaltered as well as robust to different types of attacks. A robust and blind 3D watermarking method should be able to detect the embedded message after a certain level of malicious attack without having the original model. 3D watermarking has a great potential of usage in the real world and it can be applied in the copyright protection, database management, graphics authentication and data transmission etc**.**

Keywords:- **Digital Video Watermarking, Discrete Wavelet Transform, 3-D digital water marking, Video Frame, Watermark, MATLAB**

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1. INTRODUCTION

The rapid proliferation of multimedia over internet demands sophisticated technique for secure and efficient access to information. Digital watermarking has been proposed as a technology to ensure copyright protection by embedding an imperceptible, yet detectable signal in digital multimedia content such as images or video [1, 2, 3]. The embedded signal can be used to identify the legitimate owner holding the copyright of the content.

There are two typical digital data protection techniques: cryptography and watermarking. Cryptography completely changes the appearance of the data and as a result nobody would be able to decode the message without the secret key.In contrast, watermarking preserve the observable quality of the data, for example the image fidelity, audio and video quality, in such a way that people can use the data without being aware of the existence of the embedded message. Watermarking can be used both in transmission and for data usage.

A digital watermark is robust with respect to transformations if the embedded information may be detected reliably from the marked signal, even if degraded by number of transformations. For video content, temporal modifications and MPEG compression often are added as degradation. Robustness of watermarking is important for many applications (Li Zhang et al, 2012). Robust imperceptible watermarks have been proposed as tool for the protection of digital content

2. Video Watermarking properties

A 3D watermarking system contains five main requirements including the robustness of the embedded message, capacity of the payload, blindness, security and no

distortion of the 3D surface. From the robustness point of view, the watermarking algorithms are classified as robust watermarking and fragile watermarking. A robust method aims to detect the embedded message even after the object suffered from a serious level of attacks. This category of methods is often designed for the purpose of copyright protection. On the other hand, a fragile message should disappear totally when any attack happens to the 3D mesh model. A good fragile watermarking algorithm should be able to locate the region being modified. Fragile watermarking is used for the mesh authentication and tamper detection.

• Invisibility: The digital watermark embedded into the video data should be invisible to the human observer.

• **Robustness**: It should be impossible to manipulate the watermark by intentional or unintentional [1] operations on the uncompressed or compressed video, at the same time, degrading the perceived quality of the digital video significantly thereby reducing its commercial value. Such operations are, for example, addition of signals, cropping, lossy compression, frame averaging, frame dropping and collusion.

• **Fidelity**: A watermark is said to have high fidelity if the degradation it causes is very difficult for a viewer to perceive

3. The Watermarking Process

Watermarking is the method of copyright protection in which,"watermark" signal is added to the original video signal. The watermark is a digital code embedded[3]in the video and used for the embedded transmission of binary information such that the watermark signal is un-obstructive and secure in the digital mixture. However it can be partly or fully recovered from the signal mixture later on, if the correct cryptographic key is used. To ensure imperceptibility of the modification caused by watermarking embedding,a perceptibility criteria determined by the Human Visual System(HVS)is used.

1. Design of the watermark signal W to be added to the host signal. Typically, the watermark signals depend on the key K and watermark information I:

$$W = f0 (I, K) \quad (1.1)$$

Possibly, it may also depend on the host data X that is embedded into:

$$W = f0(I, K, X) \quad (1.2)$$

Figure 1.1 shows the embedding principle of watermarking.

2. Design of the embedding[2] method that incorporates the watermark signal W into the host data X yielding watermarked data Y:

$$Y = f1 (I, K) \quad (1.3)$$

3. Design of the corresponding extraction method that recovers the watermark information from the signal mixture using the key and the original data:

$$I'' = g(X, Y, K) \quad (1.4)$$

or without the original

$$I'' = g(Y, K) \quad (1.5)$$

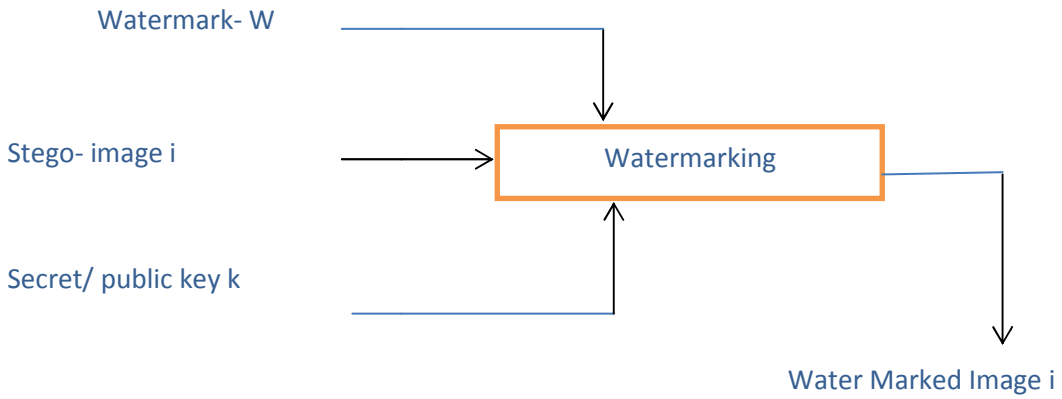


Figure 1.2 shows the detection principle of the watermarked data.

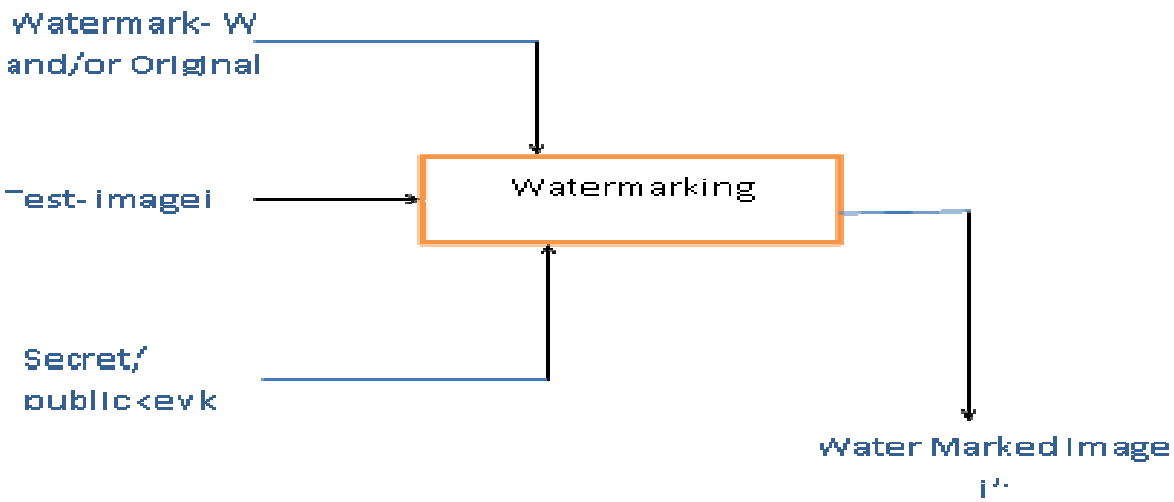
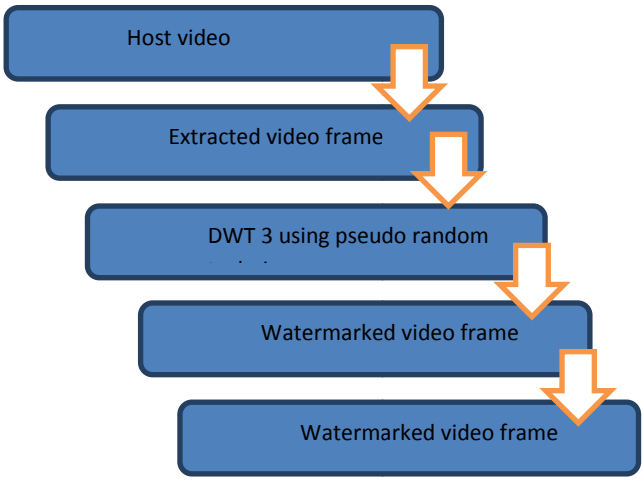


Figure: 1.2 principle block diagram of watermark extraction

1. Proposed Watermarking Technique :

This section illustrates overall technique of the proposed technique for digital video watermarking based on multilevel discrete 3-D wavelet transform. Firstly, the formation of multi-level discrete 3-D wavelet transform is presented. Then, the proposed embedding process which includes video frame extraction and key generation technique is discussed in detail.



Original Video Information:

Name	Value	Min	Max
a	<1x1 mmreader>		
b	<4-D uint8>	<Too ...	<Too ...
filename	'C:\Users\sys068\Docu...		
frame	103	103	103
mov	<1x1 mmreader>		
numberOfFrames	103	103	103
numberOfFramesW...	103	103	103
outputBaseFileName	'103.jpg'		
outputFolder	'C:\Users\sys068\Docu...		
outputFullFileName	'C:\Users\sys068\Docu...		
progressIndication	'Wrote 103 frames to f...		
thisFrame	<480x720x3 uint8>	<Too ...	<Too ...
x	'Greyscale.avi'		
y	'C:\Users\sys068\Docu...		

Evaluation and Results:

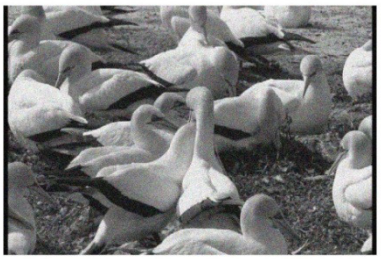
Multi-level discrete 3-D wavelet transform is applied on a window sample video with the resolution RGB24 720x480. The original extracted frame from sample video and its corresponding watermarked frame are shown in figure.

Figure 1.4 original Frame

1.5 Watermarked Frame

Noise attacked Image:

(A)



(B)

Figure 1.6 Gaussian noise attack (A) Original (B) Watermarked

To estimate the efficiency of video frames, we have taken effiency parameters (MSE & PSNR).

Frame/Frame Quality Measures	**PSNR**	**MSE**	**NAE**	**AD**
Watermarked **Frames values**	**76.26**	**30.693**	**.20**	**11.50**

Above Table shows the values for the quality measures check for video frames after performing various noise attacks against video frames. This shows better robustness of Video even after multilevel of decomposition.

Conclusion:

This paper focuses on the multilevel digital watermarking techniques performed on video. This technique will help to make a video more secure for copyright protection and content authentication. To

evaluate the effectiveness of video frame various tasks is performed.This work could further be extended for the better video quality after watermarking and for better robustness of frames.

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