An Efficient Method of Watermarking Using Multi Wavelet Technique with Modified Fast Haar Wavelet Transform (MFHWT)

Shefaly Sharma, Jagpreet Kaur

***Abstract*— Now a day we share huge amount of data through internet. Data can be of the form of text, image audio or video. We also share critical information with others. Major issue now a days is to secure our data from third person so that it can be protected from harm. In that case third person can make misuse of our data. So, to solve this problem we will make use of a new technique called Watermarking using Modified Fast Haar Wavelet Transform (MFHWT). Watermarking is a technique used for hiding the data. We need to hide the information such that any change in the data should be imperceptible. It also helps us in know whether the data is having copyright or not.**

***Index Terms*— HAAR, Multi Wavelet, MFHWT, Watermarking,Image Processing.**

I. INTRODUCTION

There are a lot of changes being made in the field of multimedia. As these advancements are being made, threats of data authentication, and protection against illegal use of data are being increased. Technologies used for security of multimedia are:

- Fingerprinting:

It is used to protect data from privacy. In this case each copy have unique identification code called Fingerprint for representing fingerprint anti-collusion code (ACC) is used.[5]

- Cryptography:

It makes use of Public Key and Private Key to protect the meaning of data.[3]

- Steganography:

It ia a method of hiding message such that only the receiver is able to read the message.

- Watermarking:

It is used to provide copyright protection and also provides robustness against various attacks.

A. Watermarking

Image is defined as a two dimensional function that is f(x,y),where x and y are spatial (plane coordinates) and f is the amplitude at any pair of coordinates which is called the intensity of plane at that point. An image may be continous with respect to the x and y coordinates and to amplitude also.

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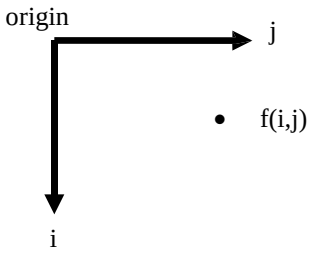
Converting such image into digital form required to digitize the coordinates and amplitude the image. When (x,y) and amplitude values of f are all finite we call the image as digital image.
Here in this diagram function is represented as f(I,j) instead of f(x,y).



Watermarking is one of the popular technique of image processing. It is used to observe authentication of licensed user over e-commerce applications and finds its use in illegal applications like copying multimedia data.
A Watermark system consists of key (public key and private key). The use of key provides security i.e. prevents unauthorized use of data.
The embedding and recovery process of watermarking is shown below:

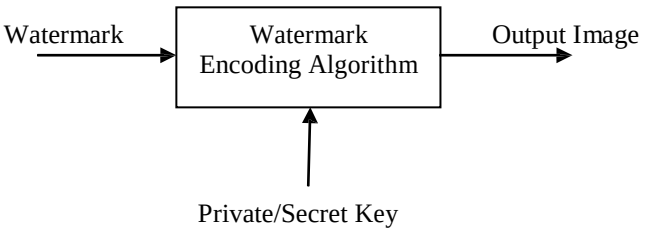


Figure 1: General Watermarking Block Diagram[3]

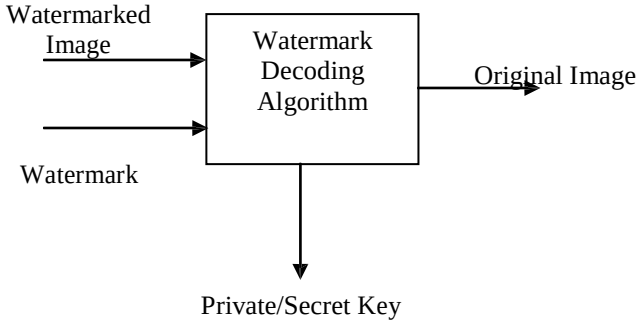
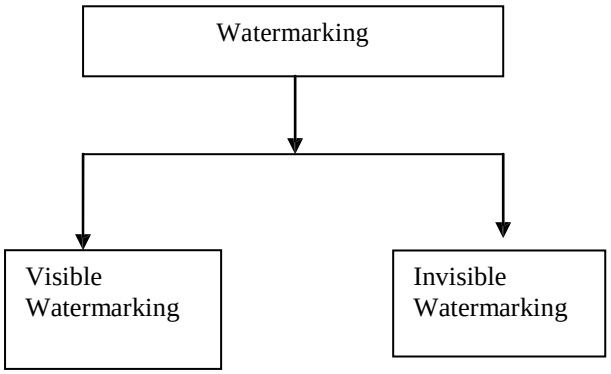


Figure 2: General Watermarking Decoding to recover Original Image[3]

Here, in this diagram, the inputs used for watermarking are:

- Watermark: the watermark used can be text, a number or an image.
- Private/Public key: public key is shared publically while private key is kept secret and due to this reason private key is also called secret key.

B. Types of Watermarking:



Visible Watermarking: It is visible semi-transparent text or image overlapped on the original image. In this we are able to see the original image but it also provide copyright protection. These watermarks are more robust against image transformation. Thus they are preferred for strong copyright protection digital form.

- Invisible watermarking: It is invisible text or image overlapped on original image. In this we cannot see the image. Only electronic devices can extract the hidden information to identify the copyright owner. Invisible watermarks are used to provide authentication.

C. *Characteristics of Watermark:*

There are three characteristics of watermarking. If we will increase any one feature then others get decreased. So we should apply it according to our needs.

- Maximal Capacity: This is a watermarking technique in which the size of watermark to be applied should be such that it should not degrade the quality of the image.[4]
- Robustness: This is a watermarking technique in which watermarked image should stand against image compression, noise, cropping effects. [4]
- Imperceptibility: Human eye should not be able to make any difference between the original image and the image to which watermark has been applied.[4]
- Security: our watermark should be able to provide security against unauthorized access to the watermark.[4]

D. *Wavelet Transformation*:

Wavelet transformations are used to solve difficult problems of physics, computers, and mathematics. I t provides various applications like compression, image processing, signal processing,etc. It allows difficult problems to be decomposed into elementary form and then reconstructed with high precision.[6]

E. HAAR Transform:

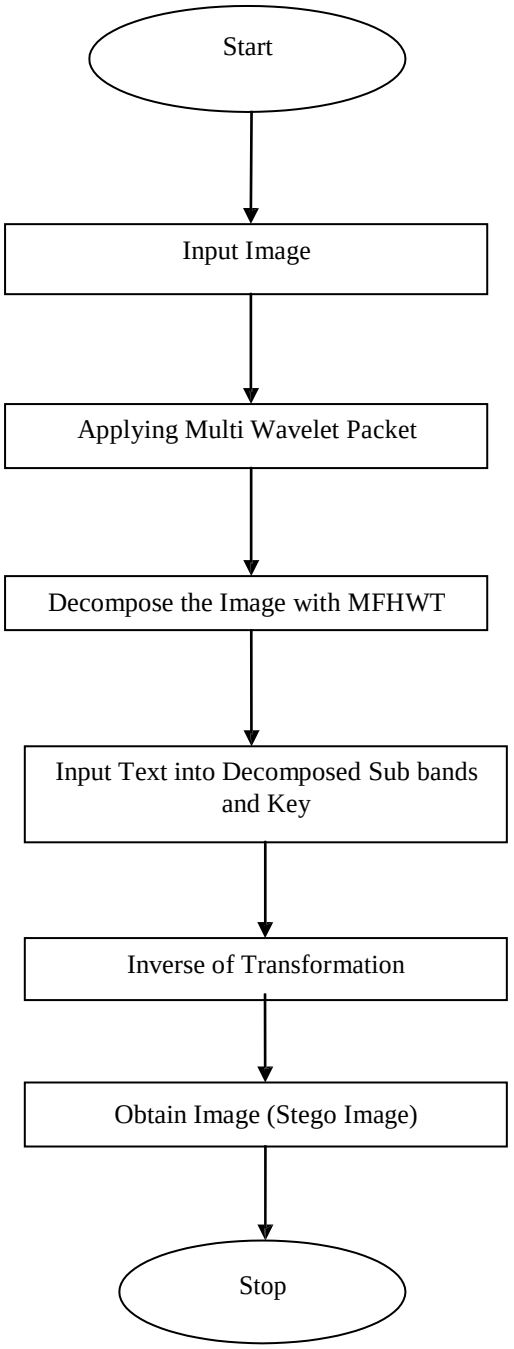
Haar transformation performs averaging and differentiation functions for deleting data, sorting coefficients, reconstructing the matrix such that final matrix is similar to initial matrix.

F. Modified Fast Haar Wavelet Transform:

MFHWT is used for 1D approach. It is faster than fast Haar transformation (FHT). By applying this method we get improved values of approximation and coefficients thatfast haar transformation (FHT) and Haar transformation (HT) because in MFHWT we need to store half of the original data and hence memory used in this case is also less.[`1]

II. PROPOSED SCHEME

In this paper , to overcome the limitations of DWT with modified Haar wavelet transform and wavelet packet transform we will design an algorithm which is robust enough that it can withstand different transmission parameters e.g. Compression filters,Reform attack,File an original copy. Flow chart for this method is given below:



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