Blind Watermarking scheme for Gray scale Images using DCT

Nidhi Patel, Pinal Suratwala, Rupal Patel, Bhakti Kaneriya, Dhara Soliya, Mansi Gandhi, Vivek Fumakia

Abstract— Digital watermarking scheme is used to protect copyrights of owners. We proposed blind watermarking scheme based on DCT (Discrete Cosine Transform) algorithm. The proposed method provides hiding a watermark in Gray Scale Image. Digital color image is transformed into Gray Scale Image then the DCT algorithm is used for watermarking process. Block based DCT algorithm used for embedding watermark. For embedding watermark, all bits of the watermark image are embedded in various DCT blocks. To extract watermark same process will be done in inverse manner. In such watermarking scheme, it requires original image to retrieve embedded image where in blind watermarking process it doesn't require cover image to retrieve embedded image.

Keywords— Digital watermarking, Blind watermarking, Discrete Cosine Transform (DCT).

1. INTRODUCTION

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. A watermark is a form of image or text that is impressed onto paper, which provides evidence of its authenticity. Digital image watermarking system can be divided into two main subsystems but complimentary to each other: embedding subsystem and extracting subsystem. In embedding subsystem, the watermark is hidden in the original image to obtain watermarked image, and to measure imperceptibility. In extracting subsystem, the output of embedding (watermarked image) is the input, and the watermark is the extracted [5].The ultimate goal is to hide messages in such a way that only the recipient, knowing what to look for, can extract them. Digital watermarking is nothing but process of conveying information by imperceptibly embedding it into digital media [1]. The image that embedded the watermark is called a watermarked image. Then the watermarked image could be published, and the owner can prove the ownership of a suspected image by retrieving the watermark from the watermarked image [2]. A digital watermark is a pattern of bits inserted into a digital image, audio or video file that identifies the file's copyright information (author, rights, etc.). Digital watermarking is method of embedding data into digital multimedia content. Digital watermarking methods are categorized into two types: non-blind and blind. Non-blind methods require the original image at the detection end, whereas blind methods do not. Blind

methods are more useful than non-blind ones because the original image may not be available in actual scenarios [6]. The purpose of embedding the information depends upon application and need of user of digital media. Digital watermarking provides the solution for difficult problem of providing guarantee to organizer and consumer of digital content about their legal rights [1].

There are two type of watermarking

1. Visible Watermarking

Visible watermark are generally used on paper such as copyright protection, digital stamp and information security. These are typically logos or text.

Fig 1. Visible Watermarking

2. Invisible Watermarking

Invisible digital watermark are generally not understandable to human eye but can be detected by computer.

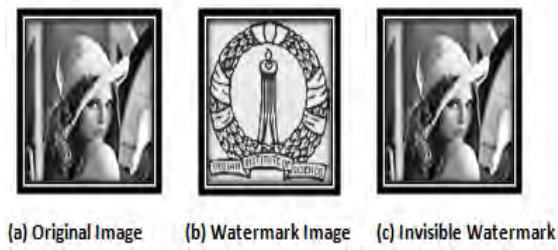

Fig 2. Invisible Watermarking

2. PROPOSED METHOD

Embedding Watermark

Step 1: Color image will transform into Gray Scale Image. This process is known as scaling down process.

Step 2: Block based DCT algorithm will takes cover image and divides it into 8*8 blocks.

Step 3: First of all it will take row value of cover image then take column value of that image. These both value makes block address.

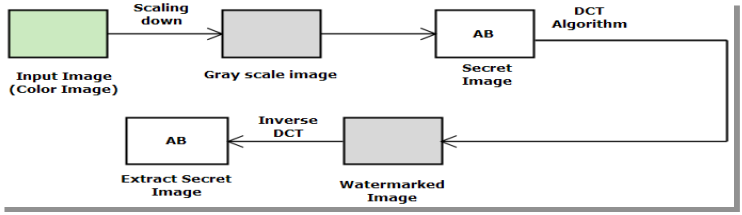

Fig 3. Working of Proposed Method

Step 4: For the embedding watermark image is updated with this formula

If binary value of secret image is 0

kx(i,j)=kx(i,j)+32;

If binary value of secret image is 1

kx(i,j)=kx(i,j)-32;

Where, kx= Respected Blocks, i=1,2,3,… and j=1,2,3,….

Step 5: Then, count the PSNR value of watermarked image by this formula,

$$PSNR = 10 \cdot \log_{10}\left(\frac{MAX_I^2}{MSE}\right) = 20 \cdot \log_{10}\left(\frac{MAX_I}{\sqrt{MSE}}\right) \quad (2)$$

Here, MAX1 is the maximum pixel value of the image.

Fig 4. PSNR Formula

Extracting Watermark

Step 1: Take the watermarked image and count size of image and convert into row column matrices.

Step 2: Get image block from row and column wise and divide this all block into 8*8 block.

Step 3: Extract each block which is divided into 8*8 and apply DCT algorithm on each this block.

Step 4: Form all the column in 32 *32 array and find difference between Blocks.

Step 5: If Difference >= 0 then, set watermark block value as 0

Step 6: If Difference < 0 then, set watermark block value as 1

Step 7: After assigning value save image into your physical path.

3. EXPERIMENTAL RESULTS

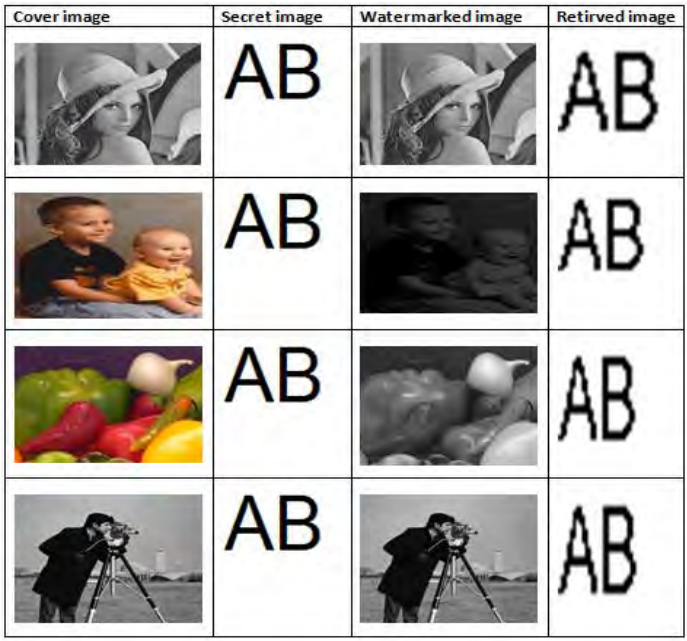

Fig 5. Experiment with different images

From above experimental result we can observe that our proposed method is give more robust image. It is give more clear image at extraction time so we can get real watermark image. Our proposed method give efficient result in type of image like bmp, tif and png.

Table1 Our proposed method results in different size and type image

Image Type	Cover image size	Watermark image size	PSNR value
Lena.bmp	512*512	85*77	41.4096
kids.tif	312*400	85*77	41.5912
Onion.png	198*135	85*77	41.4069
Cameraman.tif	256*256	85*77	41.4083

Table2 Comparison with other paper

Method	Domain	PSNR
Luminance Component[4]	DCT	40.14
Using interval wavelet decomposition[6]	interval wavelet decomposition	30.08
Our Proposed Method	DCT	41.59

4. CONCLUSION

The proposed watermarking algorithm is a non-blind robust watermarking algorithm. The main objective of this study is to design and implement a invisible robust watermarking method for gray scale images. We applied DCT Algorithm on gray scale image for hiding secret message in form of image. Using this technique we increased the value of PSNR so that the watermark can be obtained robust and effective.

5. REFERENCES

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