Analytical Comparison of DCT and LSB in Digital Watermarking

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Abstract- **In rapid development and wide use of Internet, information transmission faces a big challenge of security. Thus security of multimedia contents becomes a vital issue and there is a need in protecting the digital content against counterfeiting, piracy and malicious manipulations. Digital watermarking is a very important field for copyrights of various electronic documents and media. It is one of the proposed solutions for copyright protection of multimedia dataand multimedia content has become a very active research area over the last several years.This paper comparing two techniques and find out which one is most suitable for the image protection against the malicious, piracy and counterfeitingmanipulations of the image.This work and it' all step has been implemented through MATLAB.**

Keywords: **Digital image watermarking, Protection, Discrete Cosine Transform (DCT) ,Least Significant Bit (LSB).**

I. INTRODUCTION

The recent growth of networked multimedia systems has increased the need for the protection of digital media. This is particularly important for the protection and enforcement of intellectual property rights. Digital media includes text, digital audio, images, video and software. Many approaches are available for protecting digital data; these include encryption, authentication and time stamping.

Digital watermarking technology is an emerging field in computer science, cryptography, signal processing and communications. In this paper we present algorithms for imageauthentication and forgery prevention known as watermarks.

In this paper we present algorithms for imageauthentication and forgery prevention known as watermarks. Figure 1 shows the block diagram for watermarking digitalimages.

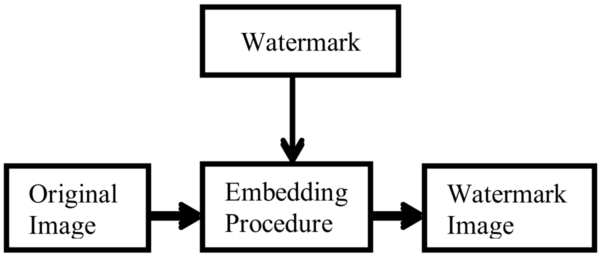

Figure 1: Block Diagram of Watermarking Algorithm

Digital Watermarking Classification

- Robustness
- Perceptibility
- Capacity

Robustness is resists a designated class of transformations. Robust watermarks may be used in copy protection applications to carry copy and no access control information.

Perceptible is presence in the marked signal is noticeable (e.g. Network Logo, Content Bug, Codes, Opaque images.).

Capacity of the embedded message determines two different main classes of digital watermarking schemes:

a. multiple-bit watermarking
b. non-zero-bit watermarking

Types of Digital Watermarks

Watermarked and watermarking techniques can be dividedinto various categories. The watermarks can be applied in spatial domain. An alternative to spatial domain watermarking is frequency domain watermarking. It has been pointed out that the frequency domain methods are more robust than the spatial domain techniques.

Watermarking techniques can be divided into fourcategories according to the type of document to be watermarked as follows.

- Image Watermarking
- Video Watermarking
- Audio Watermarking
- Text Watermarking

Image Watermarking is authentication in image by using watermarking. Video Watermarking is authentication in video by using watermarking. In audio watermarking the authentication is provided by watermarking. In text watermarking the authentication provided in text.

According to the human perception, the digitalwatermarks can be divided into three different types as follows.

- Visible watermark
- Invisible-Robust watermark
- Invisible-Fragile watermark
- Dual watermark

Visible watermark is a secondary translucent overlaidinto the primary image. The watermark appears visible to a casual viewer on a careful inspection.

The invisible-robust watermark is embedded in such a way that alternations made to the pixel value are perceptually not noticed and it can be recovered only with appropriate decoding mechanism.

The invisible-fragile watermark is embedded in such a way that any manipulation or modification of the image would alter or destroy the watermark.

Dual watermark is a combination of a visible and an invisible watermark.

From application point of view digital watermark could beas below.

- source based or
- destination based.

Source-based watermark are desirable for ownershipidentification or authentication where a unique watermark identifying the owner is introduced to all the copies of a particular image being distributed. A source-based watermark could be used for authentication and to determine whether a received image or other electronic data has been tampered with. The watermark could also be destination-basedwhere each distributed copy gets a unique watermark identifying the particular buyer. The destination –based watermark could be used to trace the buyer in the case ofillegal reselling.

Watermarking is the process that embeds data called a watermark or digital signature or tag or label into a multimedia object such that watermark can be detected or extracted later to make an assertion about the object.

II. TECHNOLOGIES

Discrete cosine Transform (DCT)

In this paper - Digital Watermarking Techniques for Protecting Digital Images which describes overview of the digital image watermarking technique and an algorithm for copy write protection of digital images in DCT domain. Digital watermarking can be defined as the process of embedding a certain piece of information, technically known as watermark into multimedia content including text documents, images, audio or video streams.The published results show that the technique is very effective both in terms of transparency, robustness to signal processing, and attempts to remove the watermark.

Least Significant Bit (LSB)

In another paper, where is theImage Watermarking Using Least Significant Bit (LSB). The simplest algorithm is Least Significant Bit (LSB) Insertion in which each 8-bit pixel's least significant bit is overwritten with a bit from the watermark. In a digital image, information can be inserted directly into every bit of image information Two techniques were presented to hide data in the spatial domain of images by them. These methods were based on the pixel value's Least Significant Bit (LSB) modifications.

III. PROBLEM

There the difficulty between the two digital watermarking,to find out the better technique between these two watermarking technique. It is typically used to identify ownership of the copyright of such signaland show the identity of its owners. It provides the authentication of the message or data information. The digital watermarking tries to control the robustness of the message or information. In this paper, this problem is totally removed, the result will showing the better technique between these two techniques.

IV. METHODOLOGY

In digital watermarking, there the embedding of original (digital) image to the watermarking (digital) image in DCT domain. The 25 standard 512 x 512 pixels gray-scale image is used as the sample of the original image and 64 x 64-pixels gray-scale image is used as the sample of the watermark image. Then thereembedding the watermark image intooriginal image in DCT domain. Then apply the Mean Square Error (MSE) and Peak Signal to the Noise Ratio (PSNR) tomeasure the image quality of attacked image.

In this section, there enhance the digital watermarking security by using the principle of embedding is fairly simple and effective. There using 25gray-scale512 x 512 pixels image for data embedding and 64 x 64 pixels gray-scale image is watermark image. This inserted directly into every bit of image information of an image can be calculated. The quality of the embedding technique is evaluated by the Mean Square Error (MSE) and Peak Signal to the Noise Ratio (PSNR) to measure the image quality of an image. The one sample image from the images as:

Original Image

Watermark Image

To calculate the PSNR, the mean-squared error is first calculated using the following equation:

$$MSE = \sum X,Y\ [I_1(x,y) - I_2(x,y)]^2 / (X*Y)$$

Where X and Y are the number of the number of rows and columns in the input images, respectively andI_1(x, y) is the original image and I_2(x, y) is the Watermarked image

The PSNR is calculated using the following equation as given below:

$$\mathrm{PSNR} = 10\log_{10} [M^2 / \mathrm{MSE}]$$

Where M represents value in the image, its value is 255for 8 bit.

IV. RESULT

The comparison of given twodigital watermarking techniques, which is based on processing time, MSE and PSNR values and their results. From result, it is clear that the processing time, MSE, PSNR and extraction time were adopted to measure the quality of the embedded watermark and watermarked image.

The process of DCT and LSB techniques are used in MATLAB.Different 25 images of different quality in MATLAB apply different processing steps and their results.This result shows that LSB technique is better than DCT technique.There isone sample of the image from the all 25 images is given below:

Gray-Scale image of Original Image

Gray-Scale of Watermark Image

Resulting DCT Image

Resulting LSB Image

This shows that LSB technique is better than DCT technique in comparison of processing speed, MSE, PSNR extraction time. The processing time of DCT is varies from 2.8620 while the processing time of LSB is around1.7416. The MSE for DCT is around 34.4846 while the LSB is around0.4386. The PSNR for DCT is around34.2764while the LSB is around56.2435.The extraction time is around 1.6764 and 16.7405 in case of LSB and PSNR respectively.

V. CONCLUSION

In the digitalwatermarking of images in which the watermarkingtechnique is invisible and designed to exploit some aspectsof the human visual system.Users expect that robust solutions will ensurecopyright protection and also authenticity of multimedia documents.In thefirst technique has been shown to be more complex as there methodology based on linear and nonlinear signal processing operations. While in second technique has been shown that it is less complex as there methodology than first technique which based on the linear and nonlinear signal processing operations.

VI. REFERENCES

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BIOGRAPHIES

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