# Gray Scale Image Authentication System Based on Discrete Cosine Transforms and PAIAS against Attacks

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**Abstract**: - *Digital watermarking is used to cover the data within a symbol that cannot be simply extracted by the third party. Its wide used application is copyright protection of digital data. It's totally different from the encoding within the sense that it permits the user to access, read and interpret the signal however shield the possession of the content. One in all the present analysis areas is to shield digital watermark within the data so possession of the data cannot be claimed by third party. With a great deal of data accessible on numerous search engines, to shield the possession of data could be a crucial space of analysis. In recent year, many digital watermarking techniques area unit given supported separate cosine transform (DCT), separate wavelets transform (DWT) and separate Fourier transforms (DFT).A secure image watermarking against totally different attack and digital watermarking is weak to varied attacks in spatial domain, therefore in most of the watermarking technique's transform domain is used. Digital watermarking has applications in many areas like broadcast observance, copy right protection etc. digital Image Watermarking is that the strategy .the owner of a copyright holder during a digital image watermarking works for copyright protection. Digital image watermarking quality is impact of DCT. Discrete cosine transforms primarily {based} entirely image watermarking technique; classification and analysis of distinct cosine transform based watermarking techniques. A secure image watermarking technique has projected a small amount replacements technique supported the tactic of watermark embedding and extraction is additionally given host image. It's not visible watermark .Digital watermarking are going to be wont to shield digital information from black and it's in addition sensible sturdy in digital image. Comparative analysis of watermarking separate cosine transforms methodology and novel embedding methodology (PAIAS) improves image hardiness supported PSNR, NC and against attack. Projected advanced image authentication system main desires the first image of robust sturdy and watermark detection.*

*Keywords: - Watermarking, Visibility, Frequency domain, Robustness, discrete cosine transform, Reversible information hiding, PSNR, Image Security.*

## I. Introduction

The digital communication technology, like internet technology confronts various troubles related to the privacy and security of the data. Security techniques are required because of illegal access of data without permission. Therefore, it is necessary to protect data in the internet technology. For providing the security of digital data various techniques are used like encryption, decryption, cryptography, steganography and digital watermarking. In this paper discusses about the digital watermarking. The digital watermarking is an application of the digital image processing. The digital watermarking is a process of information hiding. There are various techniques for hiding the information in the form of digital contents like image, text, audio and video. Basically digital watermarking is a method for embedding some secret information and additional information in the cover image which can later be extracted or detected for various purposes like authentication, owner identification, content protection and copyright protection, etc. Sometimes the scaling factor is also used for embedding the watermark in the cover image. The digital watermarking is used for the security of the digital content and to protect the data from illegal users and provides the ownership right for the digital data. An important characteristic of digital watermarking is robustness and imperceptibility against various types of attacks or common image manipulation like rotation, filtering, scaling, cropping and compression. The efficiency of digital watermarking algorithms is totally based on the robustness of the embedded watermark against various types of attacks. Digital watermarking is a method used to improve the ownership over image by replacing low level signal directly into image. Digital watermarking method is also used for the tamper proofing and authentication [1].

### 1.1 Process of Digital image Watermarking
A watermarking system is usually divided into three distinct steps, embedding, attack and detection. In embedding, an algorithm accepts the host and the data to be embedded and produces a watermarked signal. The watermarked signal is then transmitted or stored, usually transmitted to another person. If this person makes a modification, this is called an attack. There are many possible attacks. Detection is an algorithm which is applied to the attacked signal to attempt to extract the watermark from it. If the signal was not modified during transmission, then the watermark is still present and it can be extracted. If the signal is copied, then the information is also carried in the copy. The embedding takes place by manipulating the content of the digital data, which means the information is not embedded in the frame around the data, it is carried with the signal itself [2].

### 1.2 Requirements of Digital image Watermarking
The major requirements for digital watermarking are:

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**1. Robustness:** This is by far the most important requirement of a watermark. There are various attacks, unintentional (cropping, compression, scaling) and intentional attacks which are aimed at destroying the watermark. So, the embedded watermark should be such that it is invariant to various such attacks [3].

**2. Data Load:** This quantity describes the maximum amount of data that can be embedded into the image to ensure proper retrieval of the watermark during extraction.

**3 Reliability:** Watermark should be able to provide complete & reliable information for proving ownership of copyright products. The watermarking technique should be giving the reliability of recovery of watermark. The robustness of the watermarking technique is dependent upon how securely and intelligently the watermark is embedded into the host signal without any noticeable change. Robustness of the algorithm to attacks and quality of the watermarked image are related properties that are indispensable. All applications presupposing protection and use in verification of the watermarking systems require this type of marking in order to survive any kind of alterations or intentional removal introduced by standard or malicious processing and attacks [4].

**4. Perceptual Transparency:** The main requirement of watermarking is perceptual transparency. The watermark which has embedded as the owner's information should not degrade the quality of the host signal. The watermark cannot be seen by human eye. It can be detected by special processing or dedicated algorithms [5].

### 1.3 Applications of Watermarking
**1. Authentication:** Watermark is used to provide authentication. Providing an incorrect watermarked image can either destroy the watermark or leads to incorrect watermark after extraction.

**2. Digital Signatures***:* Watermarks may be used to identify the owner of the content. By having this information the user may contact the owner for acquiring the legal rights to copy or using the content [6].

**3. Copy Control***:* Watermark may contain information required by the content owner that decided the policy of copying the digital content. The information contained by the watermark may specify „content may not be copied" or „only one copy" etc. subsequently, the devices used for copying the content may be required by law to contain watermark detector, which follows directives given by the content owner [7].

**4. Broadcast Monitoring***:* Automatic identification of owners of data may be required to be done and used in systems responsible for monitoring the broadcasts. This

may help in deciding the royalty payments. It also helps in ensuring that commercials of a particular advertiser are played at right time and for a right duration

### 1.4 Attacks on Watermarked Image
There are various possible malicious intentional or unintentional attacks that a watermarked object is likely to subject to. The availability of wide range of image processing soft ware's made it possible to perform attacks on the robustness of the watermarking systems. The aim of these attacks is prevent the watermark from performing its intended purpose. A brief introduction to various types of watermarking attacks is as under.

**1. Geometric Attacks:** All manipulations that affect the geometry of the image such as flipping, rotation, cropping, etc. should be detectable. A cropping attack from the right-hand side and the bottom of the image is an example of this attack. Geometric attacks include basic geometric transformations in an image. These include geometrical distortions like rotation, scaling, translation, cropping, row-column blanking, warping etc. Geometric attacks attempt to destroy synchronization of detection thus making the detection process difficult and even impossible.

**2. Noise Attack: In** this attack, add noise to the watermark image were 0.002, 0.01, 0.08, 0.1, 0.005, 0.4, and 0.3. The extracted watermarks are affected Confuses the mark detector.

**3. Smoothing Attack:** Smoothing filters tend to blur an image, because pixel intensity values that are significantly higher or lower than the surrounding neighborhood would "smear" across the area [8].

### 1.4 Limitations of DCT
1. DCT is main a Block effect
2 .Effect of picture cropping
3. The main problems and the analysis of the DCT is the blocking effect. In DCT images are broken into blocks 8x8 or 16x16. The problem with these blocks is that when the image is reduced to higher compression ratios, these blocks become visible. This has been termed as the blocking effect [9].

## II. Literature Survey
**Bartolini F et al. [10].** Have developed an improved wavelet-based watermarking through pixel-wise masking. It is based on masking watermark according to characteristics of HVS. The watermark is adaptively added to the largest detail bands. The watermark weighing function is calculated as a simple product of data extracted from HVS model. The watermark is detected by correlation.

**S. Hong et al. [11].** A Robust and Invisible Digital Watermarking Algorithm based on Multiple Transform Method for Image Contents. In this paper, algorithm for embedding watermarking is presented. Firstly, the

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original image is compressed into JPEG image and generates the watermark by using the 2D barcode and scrambling. Secondly, JPEG image is decayed into 3 sub bands: H, V and D by using 2D DWT. Thirdly, the DFRNT (discrete fractional random transform) are performed on the sub-band coefficients. And then, watermark image is embedded into the sub-band coefficient value using quantization technique. Fourthly, the inverse DFRNT and inverse DWT is performed and lastly watermark JPEG image is obtained. The proposed algorithm has good invisibility and extraction performance, and ensures robustness

**Guzman, Meana et al. [12]**. Have developed an algorithm that relies upon adaptive image watermarking in high resolution sub-bands of DWT. Weighting function is the product expression of data extracted from the HVS model.

**K.R. Rao et al. [13].** Developed a wavelet based image adaptive watermarking scheme. Embedding is performed in the higher level sub-bands of wavelet transform, even though this can clearly change the image fidelity. In order to avoid perceptual degradation of image, the watermark insertion is carefully performed while using HVS.

**Ching-Chin Tsai et al. [14].** Proposed Digital Image Watermarking Using Discrete Wavelet Transform and Singular Value Decomposition. A hybrid image-watermarking technique based on DWT and SVD has been presented, where the watermark is embedded on the singular values of the cover image's DWT sub band. The main objective of developing this technique is to satisfy both imperceptibility and robustness.

**Li Na et al. [15].** Have proposed a DWT based method in which watermark was embedded in middle frequency coefficient using $\alpha$ as flexing factor with $\alpha = \beta |m|$, where m is mean value of all coefficients watermarking embedded. But this method doesn't provide enough security.

**Amitav Mahapatra et al. [16].** described a survey on digital watermarking techniques, the idea behind this survey is to study different kind of watermarking techniques and present a robust watermark data using DWT and introduce fragile and semi-fragile watermarking techniques.

**Ali Al-Haj et al. [17].** Combined DWT-DCT Digital Image Watermarking In this paper, Watermarking is done by embedding the watermark in the first and second level DWT sub-bands of the host image, followed by the application of DCT on the selected DWT sub-bands. The combination of the two transforms improves the watermarking performance considerably when it is compared to the DWT-Only watermarking approach.

**D. Vinita Gupta et al. [18].**Robust and Secured Image Watermarking using DWT and Encryption with QR Codes‖ [4]. In this Paper, algorithm for embedding watermarking is presented by using DWT and encrypted with QR codes. Here cover image is selected and DWT is applied on it. A key K is selected to generate the QR code as secret key. QR code and watermark image is encrypted by using XOR operation. Then the encrypted watermark is embedded into the cover image and inverse DWT is applied on the embedded watermark image. For extraction, simply apply the DWT on the cover image. This algorithm is quite simple because of the use of simple X-OR operation for encryption. This algorithm is suitable on different kind of attacks on watermarked images like JPEG Compression, Possion Noise Attack, Salt & Pepper Noise and Gaussian Noise.

**Kim et al. [19].** Proposed a watermarking method using the human visual system based on wavelet transform. The number of watermark elements is proportional to the energy contained in each wavelet transform bands. To estimate the characteristic of the image, the changing rate of a sinusoidal pattern per subtended visual angle in cycles per degree is calculated. The result is used as the visual weight of watermarks in each wavelet transform band.

## III. MATLAB Tool
It is simulating on mat lab 2013a and for this work we use Intel 2.4 GHz Machine. MATLAB may be a high-level technical calculate language and interactive surroundings for algorithmic program development, information visualization, records analysis, and numeric computation Mat lab may be a software system program that permits you to try to information manipulation and visualization, calculations, mathematics and programming. It is wont to do terribly easy moreover as terribly subtle tasks. Image process Toolbox provides a comprehensive set of reference-standard algorithms and graphical tools for image process, analysis, visualization, and algorithmic program development. You'll be able to perform image improvement, image declaring, feature detection, noise decrease, image segmentation, abstraction transformations, and image registration. Several functions within the tool case are multithreaded to require good thing about multicore and digital computer computers.

## IV. Result Analysis
Data image as Dell image and Christoph_Pomrehn as a cover image embedding and get watermark image. Embedding time in PAIAS is less compare to DCT. Watermark as a logo image as an original image extract in boat image and market image as a host image. In this process recover time in PAIAS is less compare to DCT. In this process PSNR value is high in PAIAS compare to DCT. Embedding time logo image as Dell image and Christoph_Pomrehn image as a cover image embedding and get watermark image. Embedding time in PAIAS is less compare to DCT. Recover time Watermark as a logo image as an original image extract in boat image and

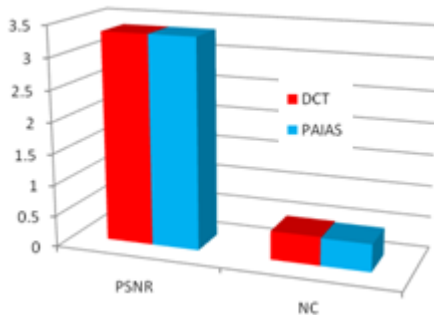market image as a host image. In this process recover time in PAIAS is less compare to DCT.



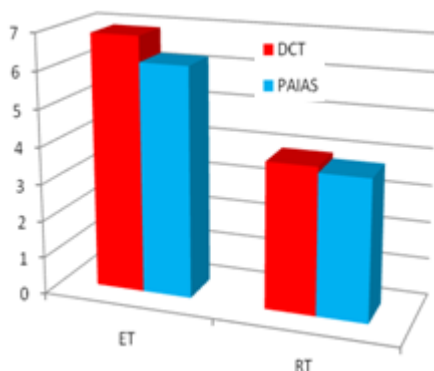Fig1 robustness comparisons between DCT and PAIAS using Christoph_Pomrehn image



Fig2 time comparison between DCT and PAIAS using Christoph_Pomrehn image

## V. Conclusion

Digital watermarking framework base method and applications used. In search focuses on information hiding and this paper focuses on digital image in frequency domain and digital watermarking techniques like DCT, DWT their benefits, disadvantages and applications. Each embedding and extraction of watermark is being done exploitation the techniques. For checking the hardiness of those strategies varied attacks on watermarked pictures are performed Noise, Rotation, noise and unshipping watermark embedded. Thus they've got complete that if genetic formula is being applied within the digital watermarking, the image becomes low sturdy and also the watermarked quality is additionally improved. DCT-DWT shows higher results among these strategies compared in terms of PSNR when attack on watermarked image .proposed advanced image authentication system recovers the first image information and find additionally has good performance in hardiness and concealing ability and computing complexness. The embedding capability of this formula is especially set by the quantitative relation between the dimensions of the first image and information image additionally known as sturdy strong in show result. Digital watermarking are going to be accustomed defend digital data from illegal and it's in addition good strong in digital image. Comparative analysis of watermarking distinct cosine transforms methodology and novel embedding methodology (PAIAS) improves image hardiness supported PSNR, NC and against attack. Planned

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