



# A Secure and Robust Digital Image Watermarking Techniques

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**Abstract** - This paper speaks to various Digital Watermarking systems which allows a person to include unseen copyright see just as some other confirmation messages to pictures with the goal that it very well may be shielded from the unapproved get to. The principle point of paper is to investigate the examination of different digital picture watermarking schemes and it likewise exhibits that all these watermarking strategies gives picture watermarking full protection and sensible limit. Here hybrid Image watermarking procedure which takes the benefits of various transforms like DWT, DCT, SVD and Arnold Transform, which improves greater security and gives heartiness to the watermark. In this paper technique, picture is separated into a few gatherings of edges, and one of the casings is chosen where watermark will be implanted. Before embed watermark in a choose casing it will be pre-handled with Arnold Transform which will give security to it.

**Keywords:** Digital watermarking, DWT, SVD, Artificial Bee Colony.

## I. INTRODUCTION

Watermarking is a procedure to full conceal a few information that will be called watermark or mark into the one of a kind information (picture, music or video) in manners that the watermark could either wiped out or recognized later to make an attestation in connection to the fundamental article [1]. Picture watermarking is a powerful technique to get familiar with the informal utilization of authorized pictures. This technique position key information into support picture which helps to find the legitimate control of picture [2].

Regularly the scaling element can likewise be utilized for watermark embedding [4]. Fig 1 is given underneath which demonstrates an evident watermark and hidden watermark utilized into host pictures.

Insurance of digital information has turned into a prominent issue because of the fast improvement of the inescapable interactive media innovation.

Copyright assurance of digital information has turned into a critical issue over expanding utilization of web. Digital watermarking is that innovation that gives security, information validation and copyright insurance of the digital information. Digital watermarking is the way toward embedding secret digital information, signal into the digital media, for example, picture, video, sound and content.



(a) Apparent Watermark



(b) Hidden Watermark

## Watermarking System

In Watermarking plan, watermark is utilized into unique picture, to confirm the host [5]. Fig 2 uncovers the well-ordered procedure of embed watermark addicted to the first picture. After that an account of commotion or different assaults corrupted picture is gotten which further identifies the watermark which was before inserted into the host picture.

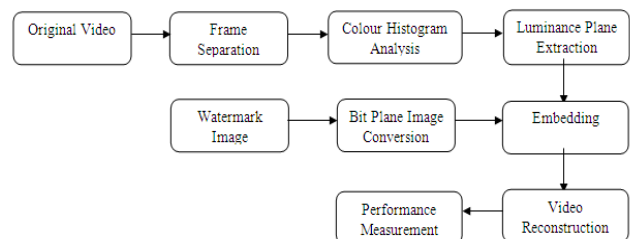


Fig 1: Process of Watermark Embedding



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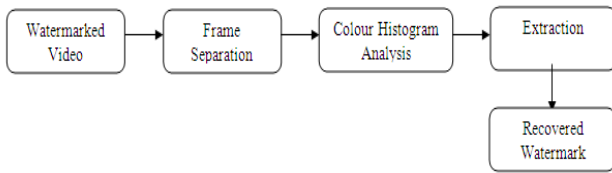
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**Fig 2: Process of Watermark Extraction**

### Top features of Digital Watermarking

**Robustness:** Watermark is said to be hearty in the event that it stays same after some assault [6]. An inserted watermark is powerful in the event that it isn't changed after an assortment of activities and controls for example scaling, separating, pressure and so forth.

**Imperceptibility:** If nature of first photograph cannot at all get affected subsequent to embed watermark then it is said to be intangible. Consequently, watermark ought to be undetectable to person vision [7].

**Security:** Watermark is to be secure just if an assailant can't take out the watermark without the learning of calculation which was utilized for embed [8]. Not permitted gatherings can never get to the watermark.

**Capacity:** Capacity or volume characterizes the quantity of bits or the greatest data which can be inserted into the host picture [9].

**Computational Cost:** It will be high if the perplexing calculations are utilized for watermarking in light of the fact that mind boggling calculations dependably utilize more equipment just as programming assets. To decrease the computational costs, watermarking strategies should be less intricate [10].

## II. LITERATURE SURVEY

### “A Secure and robust image watermarking system using wavelet domain”.

A hybrid of DWT-SVD techniques has been proposed to implanted watermark in the picture. The properties of DWT and SVD were observed to supplement each other as the proposed techniques uncovers great straightforwardness and heartiness. During trials, The PSNR esteem for all test pictures above 30db demonstrates great perceptual straightforwardness of the framework.

### “An Image Watermarking Scheme using Threshold Based Secret Sharing”.

A thought for verifying the genuine proprietorship by embedding a portion of the secret picture imperceptibly into the host or the first picture. Frequency area Techniques, for example, DWT and SVD are utilized for embedding shares into the host picture. In frequency space, contrasted with the first picture, they got watermarked picture is less misshaped which thus makes a domain that makes the inserted portion of secret picture inaccessible for any sort of abuse. The

remaining portion of secret picture is utilized to demonstrate the genuine possession.

### “An Image security utilizing watermarking dependent on DWT-SVD and Fuzzy Logic”.

Maker has new thought of developing new picture watermarking. It uses the Discrete Wavelet Transform and afterward develops a DWT, SVD approach. To be sure, even DWT have wide extent of value anyway when SVD is gotten together with it will overhaul the life of expelled picture.

### “Robust Digital Image watermarking using DWT+SVD approach”

Creator have displayed by proposed watermarking procedure for shading pictures. The proposed system utilizes a one of a kind mix of HL sub-band of DWT and SVD. These frameworks gotten by applying SVD to the DWT connected watermark picture are added to the singular lattices acquired by applying SVD to the DWT connected host picture, in appropriate extent. The nature of the watermarked picture is evaluated regarding the PSNR and relationship coefficients.

### “A Robust Encryption and Digital Watermarking Scheme for Dicom Images Using Quaternion and DWT-SVD”

Creators possess own expanded sizable preparing energy for the medicinal images. Another lossless encryption strategy making use of quaternion may be acquired which diminishes the preparing time colossally. The quaternion approach is done using counter approach of encryption and secluded wide variety juggling operations. The protection of the restorative photo transmission can even be improved by means of consolidating digital watermarking which fills in as a affirmation of the sender and also lessens the hassle in maintenance of various information. The mark of the patient and the affected person records are utilized as the watermark pictures and they are inserted inside the DICOM photograph utilizing DWT-SVD.

### “A Tale approach for Digital Image Watermarking Using 5-DWT-SVD and Stream Cipher Encryption with Dissimilar Attacks”

The creators have utilized DIW utilizing (5DWT)- SVD and SP encryption with various assaults. Broad analyses present that proposed watermarking calculations have high vigor and a decent subtlety to various normal picture preparing assaults, for example, top-cap separating, Gaussian obscuring, Gaussian haze with noise and picture change assault. To assess the productivity of the calculation and the extricated watermark picture quality, we utilized generally known picture quality capacity estimations.

### III. WATERMARKING TECHNIQUES

#### 1. DCT

The discrete cosine transform is a transformation strategy dependent on digital water-checking algorithm and spatial area system. The discrete cosine transform is gotten from discrete Fourier transforms and speaks to information as far as frequency space instead of a sufficiency space. The spatial area system can be transformed into the frequency space, and the frequency area method can be transformed back to the spatial space by utilizing reverse discrete cosine transform. The discrete cosine transform (DCT) is a strategy for changing over a signal into easy frequency segments. It speaks to a picture as an aggregate of sinusoids of differing extents and frequencies [7].

#### 2. DWT

The photograph break up into four sub-bands by DWT: “least frequency sub-band (LLe) and different numerous sub bands for instance flat extensive frequency detail sub-band (HLe), vertical big frequency detail sub-band (LHe), nook to corner huge frequency detail sub-band (HHe)”, any vicinity 'e' suggests the degree of wavelet decomposition [11]. To have the choice to pick possibly the maximum suitable sub-band to place the watermark, the validated watermark is stuck into 4 distinct sub-bands with exceptional embedding forces, in my opinion.

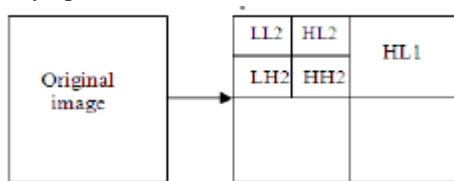


Fig 3: Workflow of 2 Level DWT

Productivity of picture watermarking applying DWT could be expanded by raising the degrees of DWT for example 2-level DWT, 3-level DWT and so on. The watermark is stuck in the lower territory of the spread picture and happened watermarked picture is better quality without dropping the evaluation of the picture. Other than this the enormous frequency sub-bands are not picked for watermarking. Fig 3 demonstrates the work process of 2 Level DWT.



Fig 4: a picture is isolated into different diverse sub bands. The LL sub band is additionally decayed into four other sub-bands. The LL sub band holds greatest data.

#### 3. SVD

By view of picture preparing, an image may be considered as the lattice with nonnegative scalar passages. SVD is extremely a decided numerical assessment tool connected to investigate networks. The SVD of an image M with size  $x \times x$  is composed by  $M = USVT$ , any place U and V both are symmetrical lattices, and  $S = \text{diag}(\lambda_i)$  is only a corner to corner framework of singular values  $\lambda_i, I = 1, \dots, m$ , that ought to be sorted out in sliding order. Sections of U and V would be the left singular vectors and right singular vectors individually of picture M. These watermarking strategies are principally utilized for acquiring either SVD of unique picture or each square of host picture, moreover it modifies singular values to the watermark. The primary segment grid is given as following.

$$PC = U \times S$$

#### 4. Artificial Bee Colony

ABC is extraordinarily a simple and possible populace based enhancement set of rules. “It is identified with the wise rummaging physical activities of the bumble bee swarms. The in all likelihood selections are proven via the sustenance supply in ABC and wellness of a element of these alternatives is proven via the nectar amount of the nourishment supply. In this set of rules, you will discover 3 classifications of honey bees in agreement of counterfeit honey bee: utilized honey bees, spectators and scouts. The general amount of utilized honey bees is relating to how many staple alternatives is there throughout the hive. Utilized honey bee whose sustenance asset got omitted by using the honey bees movements toward becoming scout”. ABC consists of 3 crucial components.

### IV. RESULTS ANALYSIS

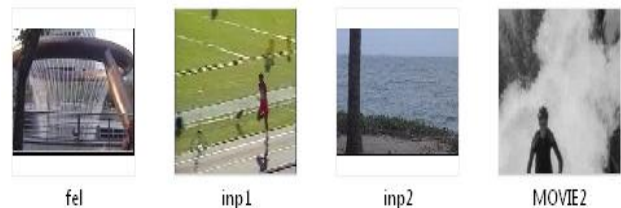


Fig: 5 Input Videos



Fig: 6 Frames Separation Process using frame 2 Image Conversion

The Quality of the reconstructed picture is measured in phrases of mean square error (MSE) and peak signal to noise ratio (PSNR).

### Mean Square Error: -

The MSE is regularly called reconstruction error variance  $\sigma_q^2$ . The MSE among the original image  $f$  and the reconstructed photo  $g$  at decoder is defined as:

$$MSE = \sigma_q^2 = \frac{1}{N} \sum_{j,k} (f[j, k] - g[j, k])^2$$

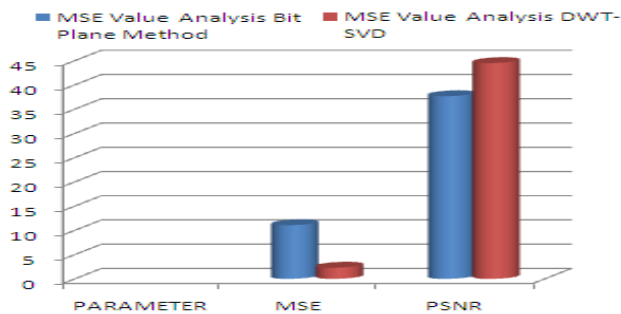
Where the sum over  $j, k$  denotes the sum over all pixels in the photo and  $N$  is the number of pixels in every photograph. From that the peak signal-to-noise ratio is defined as the ratio between signal variance and reconstruction blunders variance.

MSE Value Analysis		
METHOD	Bit Plane Method	DWT-SVD
PARAMETER		
MSE	11.084217	2.3042
PSNR	37.683754	44.5056

### Peak Signal to Noise Ratio: -

The PSNR among pictures having eight bits in step with pixel in phrases of decibels (dBs) is given by:

$$PSNR = 10 \log_{10} \left( \frac{255^2}{MSE} \right)$$



## V. CONCLUSION

A digital watermarking is presumably the strong infers to expose the particular unauthorized employments of copyrighted images. “So this paper seems about the correlation of various strategies depending on photograph watermarking. This paper demonstrates that the ABC for watermarking has advanced results while actualized at the DWT, SVD techniques yet there are some issues, for example, the usage of watermark scrambling still are unaddressed. In not so distant destiny another method can be proposed so as to enhance the velocity and protection of the watermarking system in addition”.

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