



## *Watermarking for secure Communication based on Three level DWT cum SVD (3DWTS) Method*

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**ABSTRACT:** Watermarking is a type of security technique in obscurity; art & science of hiding available of a message between sender & intended recipient. however techniques that are been developed in area are based of complex & pattern based data hiding in pixels of images, later on key based approaches are also been developed, later on many combination (two different approaches cryptography & Watermarking working together) based procedure been developed. proposed work is new concept for Watermarking that is analytical cum pattern based Image Watermarking proposed procedure is been developed for achieving very high SNR & low MSE even if size of original is less, actually only problem with Watermarking is that it requires many of data ( a full image) for transmitting few original data, so proposed work aims to reduce size of image while maintaining size of original data same. Proposed paper is a unique DWT & SVD based procedure for Watermarking.

**Keywords** – Discrete Wave Transform, Discrete Cosine Transform, Watermarking, cryptography. Peak Signal to Noise Ratio (PSNR), MSE: Mean Square Error

### **I-INTRODUCTION**

Wavelet change is utilized to change over a spatial area into recurrence space. utilization of wavelet in picture stenographic model lies in certainty that wavelet change unmistakably isolates high recurrence and low recurrence data on a pixel by pixel premise. Discrete Wavelet Transform (DWT) is favored over Discrete Cosine Transforms (DCT) on the grounds that picture in low recurrence at different levels may offer relating determination required. A one dimensional DWT is a rehashed channel bank calculation, and information is convolved with high pass channel and a low pass channel. consequence of last convolution is smoothed rendition of info, while high recurrence part is caught by first convolution. remaking includes a

convolution with blend channel and consequences of this convolution are included. In two dimensional change, first apply one stage of one dimensional change to all lines and then rehash to all segments. This disintegration comes about into four classes or band coefficients.

The Haar Wavelet Transform is most straightforward of all wavelet change. In this low recurrence wavelet coefficient are created by averaging two pixel esteems and high recurrence coefficients are produced by taking portion of contrast of same two pixels. four groups acquired are surmised band (LL), Vertical Band (LH), Horizontal band (HL), and corner to corner detail band (HH). guess band comprises of low recurrence wavelet coefficients, which contain huge piece of spatial area picture. different groups likewise called as detail groups comprises of high recurrence coefficients, which contain edge points of interest of spatial space picture.

Research into human observation demonstrates that retina of eye parts a picture into a few recurrence channels, each crossing a data transmission of roughly one octave. single in these channels is prepared autonomously. Thus in a multilevel deterioration, picture is isolated into groups of around rise to data transmission on a logarithmic scale. It is accordingly expected that utilization of DWT will permit free preparing of coming about segments without huge detectable collaboration between them, and consequently makes technique indistinctness stamping parcel powerful. Therefore wavelet deteriorations is regularly utilized for combination of pictures. Combination strategy incorporate straightforward system of pixel averaging to parcel convoluted strategies, for example, vital segment investigation and wavelet change combination. A few ways to deal with picture combination might be recognized; contingent upon whether picture is melded in spatial area or some other spaces, and their change intertwined. Picture combination is a

strategy that creates a solitary picture from an arrangement of information pictures. combined picture contains part total data, than any individual information. Since this is a sensor-packs data issue, it takes after that wavelets, traditionally helpful for human visual processing, data compression & reconstruction are useful for such merging. Other important applications of fusion of images include medical imaging, microscopic imaging, remote sensing, computer vision & robotics.

HH3	HL3	HL2	HL1
LH3	LL3		
LH2		LL2	
LH1			LL1

Figure1: Three phase decomposition using DWT.

**II--AVAILABLE WORK**

Krishna Rao Kakkirala [1] proposed a square based visually impaired picture watermarking utilizing DWT, SVD and Torus automorphism and additionally demonstrated that this method is hearty against various types of geometric and flag preparing assaults strategy removes watermark without cover picture and likewise demonstrated that this technique is strong against various flag and non flag handling assaults.

Tanmay Bhattacharya et al [2] examined that Forward kind Discrete Wavelet Transform is great to discover territories in covering picture that where might be privet information might be concealed effectively because of their productive space and recurrence determination properties Their system for Watermarking has following advances additionally appeared in figure2:-

1. Cover picture is disintegrated into four sub groups(LL,LH,HL and HH)utilizing DWT.
2. Privet information are taken and changed over into various 1D Vectors.
3. Pseudo irregular arrangement produced by session based key.
4. Every HL and HH sub band of cover picture are altered independently utilizing comparing succession relying on substance of relating information 1D to be installed.
5. Four sub groups including two altered sub groups are joined to create stego picture utilizing IDWT.

In year 2012 at Fifth International Workshop on Chaos-fractals Applications and Theories, Mr. Sandra Bazebo Matondo and Mr. Guoyuan Qi from Department of Electrical Engineering, Tshwane University of Technology Pretoria, South Africa proposed another examination work entitle "Two-Level Image Encryption Algorithm Based on Qi Hyper-Chaos [3]"

There work was upheld by awards of Incentive Funding of National Research Foundation of South Africa and Eskom Tertiary Education Support Program of South Africa

This work presents a two-level encryption calculation in light of abnormal state of haphazardness of Qi hyper-bedlam and their affectability to beginning condition. With DC based encryption and pixel change individually first and second level; qualities of plain picture have been concealed and remained careful from various sorts of assaults. investigation demonstrate that Qi hyper-disarray have greater key space, quicker encryption speed because of their speedier pseudo irregular succession age rate contrasted and existing turbulent frameworks [3].

To check relationship between's two adjoining pixels they infer new recipe exhibit Pairs Analysis and contrast their execution and chi-square attacks.

$$Cr = \frac{N \sum_{j=1}^N (x_j + y_j) - \sum_{j=1}^N x_j \times \sum_{j=1}^N y_j}{\sqrt{(N \sum_{j=1}^N x_j^2 - (\sum_{j=1}^N x_j)^2) \times (N \sum_{j=1}^N y_j^2 - (\sum_{j=1}^N y_j)^2)}}$$

Their watched result was they took a picture size of 512x512 and scramble it to test their calculation. Utilizing their particular encryption, just 4096 DC coefficients gets scrambled to change estimations of aggregate 262144 pixels [3].

Belmeguenai Aïssa, Derouiche Nadir, and Redjimi Mohamed presents Image Encryption Using Stream Cipher Algorithm with Nonlinear Filtering Function, In their Work, another calculation based encryption plot for picture information was presented, their recreations were completed with various pictures. Their visual test shows that their encoded picture was altogether different and has no visual data which might be reasoned about unique picture for all pictures. Furthermore, their method was exceptionally easy to execute, encryption and decoding of a picture. Their proposed calculation may to opposes added substance commotions<sup>[4]</sup>.

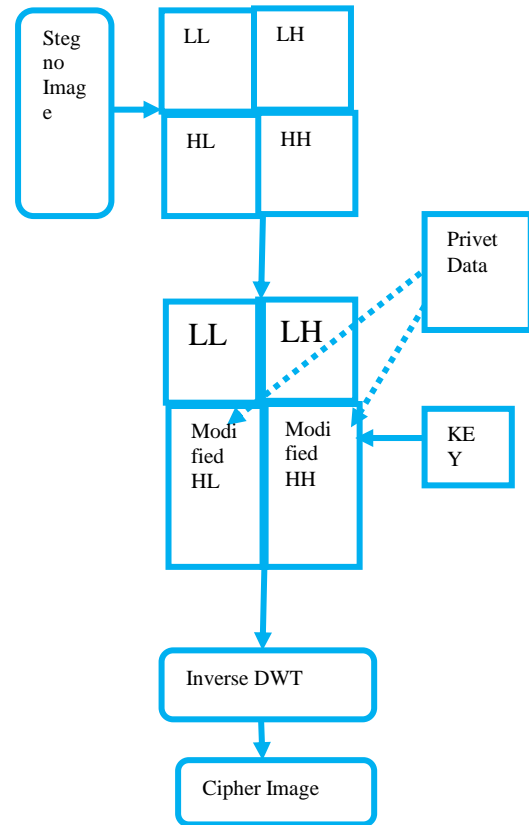


Figure 2: image steganography in base work

Base[1]	Krishna Rao Kakkirala & Srinivasa Rao Chalamala, Block Based Robust Blind Image Watermarking Using Discrete Wavelet Transform, Proposed a blind image watermarking technique which embeds watermark into image in frequency domain using discrete wavelet transform, singular value decomposition & torus automorphism techniques. This technique extracts watermark without cover image & also proved that this procedure is robust against different signal & non signal processing attacks. They hide watermark in Image with BER of 0.29 in JPG images.
Base[2]	Tanmay Bhattacharya, Nilanjan Dey & S. R. Bhadra Chaudhuri, A Novel Session Based Dual Steganographic Technique Using DWT & Spread Spectrum, Their approach may be applied for colour image & also for audio Watermarking because DWT is applicable for any digital signal, they observed PSNR of 27.3850
Base[3]	Mr. Sandra Bazebo Matondo & Mr. Guoyuan Qi, Two-Level Image Encryption Algorithm Based on Qi Hyper-Chaos, Their observed result was they took an image size of 512x512 & encrypt it to test their algorithm. Using their selective encryption, only 4096 DC coefficients gets encrypted to change values of total 262144 pixels, correlation found in cipher is images is

	0.9830
Base[4].	Belmeguenāi Aïssa, Derouiche Nadir, & Redjimi Mohamed, Image Encryption Using Stream Cipher Algorithm with Nonlinear Filtering Function, Their procedure was very simple to implement, encryption & decryption of an image. Their proposed algorithm may resist additive noises, correlation found in cipher images is 0.0975

Table 1: Comparison of Published Stenographic Algorithms

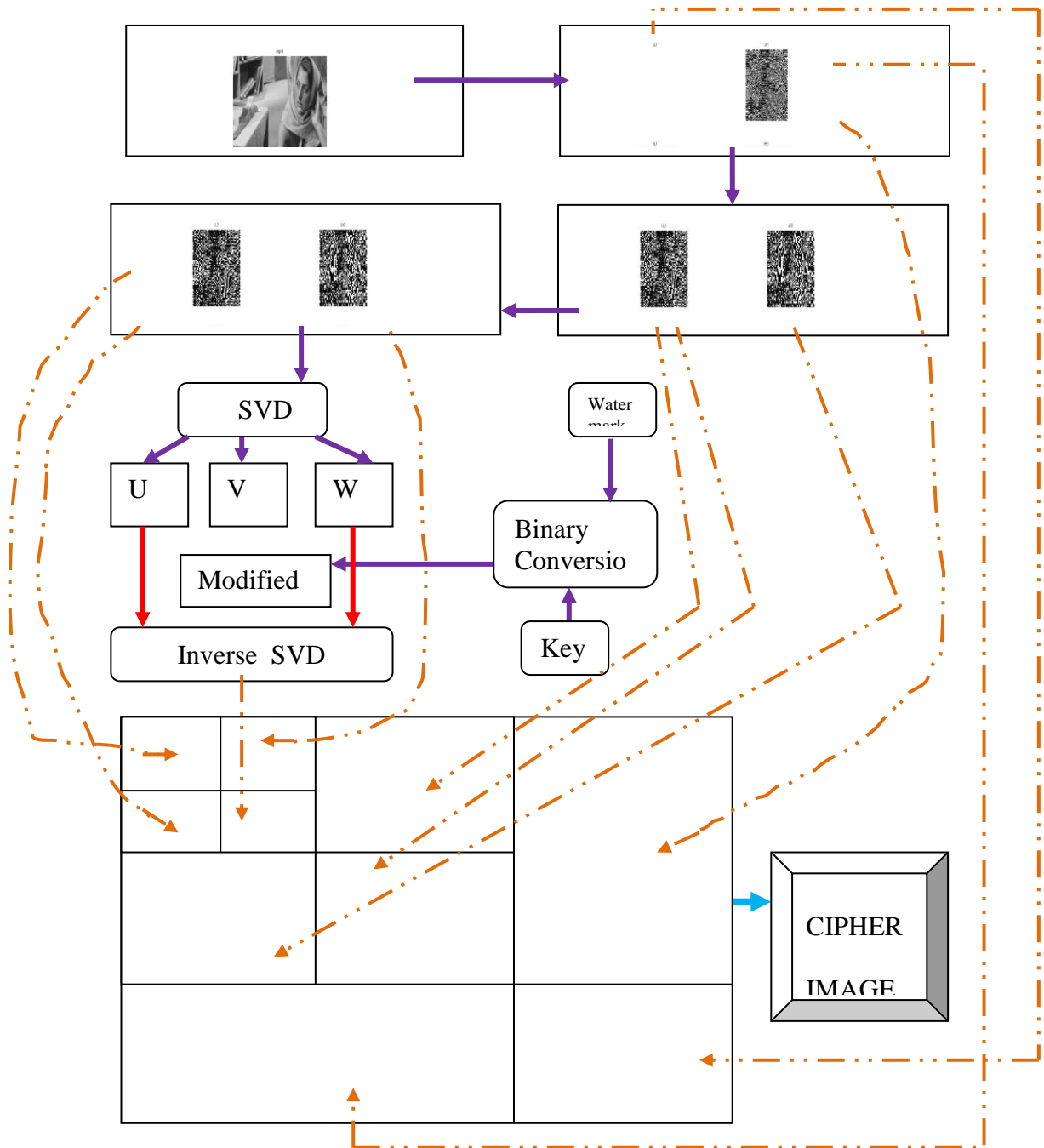


Figure 3 Proposed Design flow

**III--TECHNIQUE ADOPTED**

Figure 3 shows proposed method. At first step image is been taken through MATLAB & then in MATLAB environment it gets converted into pixels form (integer numbers) for data hiding as it is an analytical approach we required to convert it into frequency cum time domain which is possible with Wavelet transform only there are many transform techniques are available so it was our decision to made that up to what we required time or frequency resolution if we choose ‘db1’ then very good frequency resolution & if we choose ‘db10’ then time resolution gets better so we have chosen ‘db5’ wavelet which give adequate time & frequency resolution. After transform comes to new procedure to find out area where one may hide pixels in image & it affects original image negligibly for that we have chosen correlation of pair of three continuous pixels to search required area where one may hide data significant

**IV-RESULTS**

Data Image size	Cover image size	MSE	SNR
8kb	200kb	0.089	85.2
14kb	200kb	0.098	84.8
22kb	200kb	0.102	83.1
25kb	200kb	0.154	82.9

**Table 2: observed results**

Table 2 shows Mean square Error observed for different size of Data & cover image & it also shows Signal to Noise ratio (SNR) for different scenario, it may be easily seen that observed results that Maximum SNR is 98.2 which is quite good however it gets reduces when size if covering image increases after deeply analysing results it may be said that results are as was expected & it is very clearly hiding data image into covering –stegno-image

**IV--CONCLUSION**

Major problem with available work that most of stenographic technique did not care about stgno image follow same KEY based hiding approach for any stegno image or data, & procedure which are based on transform of stegno image before data hiding sometime did not use KEY or sometime use KEY however at HH band hiding with a fixed approach. Proposed work is a new approach of data hiding in Images with using DWT & also proposed work has new procedure adopted for computing correlation between pixels of dwt HH band, we do that finding significant pixels where data may be hide at LSB & quality odd image affect negligibly.

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