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# Review of Digital Watermarking Technique for Copy Write Protection in Color Image using DWT and SVD

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***Abstract*** *– A new Image recognition technique supported wavelet transform (DWT) and Singular price Decomposition (SVD) that's capable of retrieving most of the photographs like the target image. during this technique used DWT to transfer the target image from the spatial domain into frequency domain during which it's divided into four sub bands, Low-Low (LL), Low-High (LH), poker (HL) and High-High (HH) frequencies. during this applied 3 levels of 2-D DWT to concentrate the image illumination elements into the third-level LL sub band and so applied SVD to extract its singular values because the reliable and strong options for the popularity. we tend to additionally calculated the mean and variance of the low frequency LL sub-band for the input image to make a feature vector composed of mean, variance, and singular values of the LL sub band, also because the coefficients of the LL sub band. Once the feature vector is made it's compared with the feature vectors keep in our information to acknowledge and retrieve the pictures that are like target image supported the minimum error criteria.*

***Keywords****: Watermarking; RGB color space; Discrete Wavelet Transformation; Singular Value Decomposition.*

## I. Introduction

Digital information (such as pictures, audio and video) is wide offered on-line. Multiple copies of original information may be created simply and it's troublesome to differentiate between original and derived information. This creates the matter of owner identification, authentication and copyright protection. Watermarking could be a potential resolution. In digital watermarking some data (images, audio, and video) may be embedded into the information in such how that it's not perceptible to human eye. This hidden information will later be extracted to prove the possession. the standard of watermarking theme is based on 2 conflicting needs, strength (measured exploitation normalized correlation (NC)) and physical property (measured exploitation peak signal to noise magnitude relation (PSNR)). supported the domain, watermarking may be classified into spatial and frequency .In spatial domain (generally less advanced, less strong and fewer secure) the element values of canopy image are directly changed for watermark embedding [5]. In frequency domain (relatively strong, secure and imperceptible), the duvet image is remodeled to different domain (using discrete cosine transform (DCT), discrete wavelet transform (DWT), discrete Fourier transform (DFT)) for watermark embedding. Most of the image watermarking schemes is applicable for grey level pictures and a few schemes are concerning color pictures. Out of color image watermarking Schemes, uses DWT and singular worth decomposition (SVD) whereas uses DWT and uses SVD for watermark embedding. during this paper, we tend to explore a RGB color image watermarking technique exploitation DWT (discrete wavelets transform) and SVD (singular worth decomposition). The DWT and SVD are applied to R, G and B parts of an explicit image and watermark image (i.e., copyright message) and so the processed watermark data is embedded into the 3 parts, wherever an optimum DWT band, level and an best choice watermarking scaling issue are used for higher sensory activity similarity and strength. within the watermarking extraction stage, watermarks are extracted from the R, G and B parts of the watermarked image and so a final watermark is generated by averaging these 3 parts. This section presents the planned RGB color image watermarking. Two-dimensional separate rippling transformation (DWT) and singular worth decomposition (SVD) are used permanently stability of watermarked image. In RGB pictures, R, G and B channels are extremely related to and for quality watermarking (to

improve imperceptibility) it's fascinating that these channels are unrelated.

## II. Literature Review

Rashedul Islam et.al. [1] "Reliable RGB Color Image Watermarking using DWT and SVD" This paper planned a reliable RGB color image watermarking exploitation DWT and SVD. The DWT and SVD increased strength and capability of watermarking and sensory activity similarity exploitation an optimum price of watermarking scaling issue (α). The planned technique achieved 1.0 within the normalized correlation (NC) of extracted watermarks once noise attacks. Additionally, the planned technique achieved concerning 67 and 53 within the PSNR of the watermarked image while not noise once image process attacks, severally. Additionally, the planned technique outperformed different 2 state-of-arts models in terms of sensory activity similarity, robustness, and detection rate. within the future, we are going to compare the planned technique with different existing ways.

Y. RAGHAVENDER RAO et. al. [2] "Reliable RGB Color Image Watermarking using DWT and SVD" This paper planned a reliable RGB color image watermarking exploitation DWT and SVD. The DWT and SVD increased strength and capability of watermarking and sensory activity similarity exploitation an optimum price of watermarking scaling issue (α). The planned technique achieved 1.0 within the normalized correlation (NC) of extracted watermarks once noise attacks. additionally, the planned technique achieved concerning 67 and 53 within the PSNR of the watermarked image while not noise once image process attacks, severally. additionally, the planned technique outperformed different 2 state-of-arts models in terms of sensory activity similarity, robustness, and detection rate. within the future, we are going to compare the planned technique with different existing ways.

Harish N J et. al.[3] "Hybrid Robust Watermarking Technique Based on DWT, DCT and SVD" In this planned paper taken for analysis of various cowl pictures like Lena River and House for comparison the distinction between PSNR and MSE values. all told the cases the worth of PSNR is well on top of 20dB that shows the great quality of embedding algorithmic rule compared of different techniques like DWT watermarking or DCT watermarking of DWT and SVD watermarking, the evaluated PSNR worth restricted up to 20-30dB alongside diagonal line issues or false positive issues.

Dr. Mohammad V. Malakooti et. al.[4] "Image Recognition Method based on Discrete Wavelet Transform (DWT) and Singular Value Decomposition (SVD)", In this paper we tend to planned a replacement content-based image retrieval technique supported each DWT and SVD after they applied on the input image. In this paper got applied three-level DWT on the input image to cut back the image redundancy and to divide the processed image into four sub-bands. Then in this paper tend to apply the SVD on the low frequency LL sub-band to extract its singular values. we tend to additionally build a feature vector consists of the mean and variance of LL sub band, coefficients of low frequency LL sub-band, also as its singular values to be used for a reliable and strong image recognition and retrieval. the mixture of of these options authorized our system to retrieve similar pictures terribly accurately. To demonstrate the performance of our technique over the present ones we tend to apply our model on a information of containing 500 pictures [9]. The retrieved pictures that are extremely just like the input image are obtained by calculation of the euclidian distance between the input image feature vector and every one existing feature vector in information. If the gap live is zero the retrieved image are precisely because the input image and additionally indicates that corresponding image was antecedently keep within the information.

Nikita Kashyap et. al.[5] "Image Watermarking Using 3-Level Discrete Wavelet Transform (DWT)", In this paper, a picture watermarking technique supported a 3-level separate ripple remodel has been enforced. this method will implant the invisible watermark into salient options of the image mistreatment alpha mixing technique. Experimentation results shows that letter of the standard of the watermarked image and therefore the} recovered watermark are dependent solely on the scaling factors k and q and also indicate that the 3 level DWT offer higher presentation than 1-level and 2-level DWT. All the results obtained for the recovered pictures and therefore the watermarks are just like the initial pictures.

## III. Method

### A. Discrete Wavelet Transform (DWT):-

DWT is an orthogonal remodel the same as the distinct cosine remodel which will be used for the audio and video compression, Speech recognition, feature extraction, finger print, Watermarking and lots of different applications in medical specialty engineering. DWT has higher time and frequency resolution than DCT and its coefficients may be calculated by performing arts the ordered Low pass and High pass filter on the Discrete-Time samples. There are several applications of DWT within the image process field, like feature extraction, face recognition, watermarking and compression [5].The first level DWT divides an input image into four sub-band pictures., wherever every sub-band image contains one in all high frequency bands and low frequency bands: LL, LH, HL, and HH, wherever LL denote an occasional frequency sub-band, gonadotrophic hormone a horizontal high frequency sub-band, hectoliter vertical high frequency sub-band, and HH a diagonal

high frequency sub-band. [6]Here the third-level DWT decomposition LL3 sub-band image is very important for America to scale back the input image size and extract options to be saved within the feature vector. many techniques will remodel a picture into the frequency domain, like DCT (discrete trigonometric function transform), DFT (discrete Fourier transform), and DWT (discrete wave transform). DWT is extremely effective to excellent reconstruction of an rotten image.

**B. Singular Value Decomposition (SVD):-**

Singular worths of a picture provide sensible stability that helps to stay the image stable once adding little value [4]. SVD relies on a theorem from algebra number. The SVD is one the strongest mathematical tools which will be wont to decompose any sq. or non-square matrix, A, into the multiplication of 2 unitary matrices U and V and one square matrix D. SVD is wont to apply on any pictures to extract its helpful options by moldering the digital image matrix into 3 orthogonal matrices [2].The SVD of the matrix A is written as following:

$$A = UDV^T$$

Where the matrices of U and V are same to be unitary, the orthogonal matrices with length one, and D may be a square matrix comprised of the singular worth of matrix A. SVD is wont to approximate any matrices with its best rank approximation exploitation the Frobenius norm, wherever the smaller singular values are set to zero and also the matrix is reconstructed with a fewer singular values than its original singular values. The SVD is used for the calculation of pseudo inverse of the matrix A, Least sq. curve-fitting, matrix approximation, and deciding the vary and mathematical space of a matrix.

## IV. Conclusion

This paper planned a reliable RGB color image watermarking exploitation DWT and SVD. The DWT and SVD increased strength and capability of watermarking and sensory activity similarity exploitation an optimum price of watermarking scaling issue (α). a replacement content-based image retrieval technique supported each DWT and SVD after they applied on the input image.The input image to scale back the image redundancy and to divide the processed image into four sub-bands. Then in this paper applied the SVD on the low frequency LL sub-band to extract its singular values. A feature vector consists of the mean and variance of LL sub band, coefficients of low frequency LL sub-band, additionally as its singular values to be used for a reliable and strong image recognition and retrieval. the mix of these options authorized proposed system to retrieve similar pictures terribly accurately.

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