

SAFE DATA HITTING IN TRANSFORMDOMAIN FOR DIGITAL VIDEO SEQUENCE

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Abstract: Image compression is a process to remove the redundant information from the image so that only essential information can be stored to reduce proposed in the wavelet the domain using SECURE zone (SZ) concept. This mechanism is robust against different attacks that can be applied on video sequences. Selective embedding mechanism is introduced for data hiding with the help of SZ concept. Experimental analysis in terms.

The comparison of the this combined DCT + DWT method has been done with the previous techniques available i.e. DCT and DWT and it was found that the results of the proposed algorithm are much better than alone DCT and DWT algorithms in terms of peak signal to noise ratio (PSNR), mean square error (MSE) and compression ratio (CR).

Keywords: CR, DCT, DWT, MSE, PSNR.

1. Introduction:

The increasing demand for multimedia content such as digital images and video has led to great interest in research into compression techniques. The development of higher quality and less expensive image acquisition devices has produced steady increases in both image size and resolution, and a greater consequent for the design of efficient compression systems [1]. Although storage capacity and transfer bandwidth has grown accordingly in recent years, but many applications still require compression.

In general, this paper investigates still image compression in the transform domain. Multidimensional, multispectral and volumetric digital images are the main topics for analysis. The main objective is to design a compression system suitable for processing, storage and transmission, as well as providing acceptable computational complexity suitable for practical implementation. The basic rule of compression is to reduce the numbers of bits needed to represent an image. In this paper we will discuss algorithm for DCT, DWT and the combined DCT+DWT.

1.1 Data Compression Model

The NSCT is completely shift invariant, multi-scale and multi direction expansion that has better directional frequency localization and fast implementation where it helps to achieve the similar sub band decomposition as that of contourlet but without the down samplers and up samplers in it [8]. The NSCT construction can be divided into two parts where one part demonstrates the non sub-sampled pyramid structure, which splits the input into a low pass sub band and a high pass sub band. The other is non sub-sampled directional filter bank structure, which decomposes the high pass sub band into several directional sub bands as shown in Fig.1. This process is iterated repeatedly on the low pass sub band outputs of non sub-sampled pyramids. Here, non sub-sampled pyramids provide multiscale decomposition and non sub-sampled directional filter banks provide directional decomposition

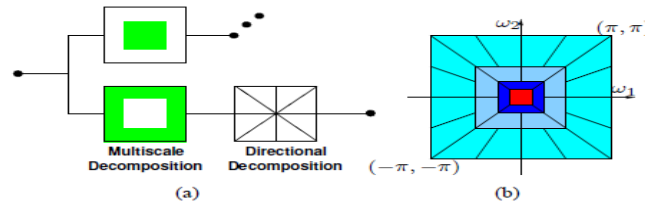


Figure 1: Illustration of Non-sub-sampled Contourlet Transform (a) Block diagram (b) Resulting frequency division

1.2 Transform-based Image Compression

Transform refers to changing the coordinate basis of the original signal, such that a new signal has the whole information in few transformed coefficients. The processing of the signals in the transform domain is more efficient as the transformed coefficients are not correlated [3]. A popular image compression framework is the transform based image compression as shown in below Figure 2

The first step in the encoder is to apply a linear transform to remove redundancy in the data, followed by quantizing the transform coefficients, and finally entropy coding then we get the quantized outputs. After the encoded input image is transmitted over the channel, the decoder reverse all the operations that are applied in the encoder side and tries to reconstruct a decoded image as close as to the original image [4].

II. SECURE ZONE BASED SELECTIVE DATA HIDING

This method depends on the secure zone concept which means that no alteration is been allowed in this region for data hiding process. Let s be the host signal in R and $m \in \{0,1\}$ be the data to be hidden [3]. Then the marked signal is obtained as

$$\hat{s} = \begin{cases} s, & s \in FZ \\ M_m(s), & s \in AZ \end{cases} \quad (1)$$

Where FZ is the forbidden zone and AZ is the allowed zone and $M_m(s)$ is the mapping function which can be expressed as

$$M_m(s) = \{s + e_m(1 - \frac{r}{||e_m||})\} \quad (2)$$

The FZ can be knows from

$$\begin{aligned} FZ_m &= \{s | ||e_m|| \leq r\} \\ AZ_m &= \{s | ||e_m|| > r\} \end{aligned} \quad (3)$$

During the extraction process minimum distance approach has been considered

$$\hat{m} = \text{argmin}_m d(y, y_m) \quad (4)$$

Where y is the received signal and y_m is equal to the FZ obtained.

III. NON SUBSAMPLED CONTOURLET TRANSFORM

The NSCT is completely shift invariant, multi-scale and multi direction expansion that has better directional frequency localization and fast implementation where it helps to achieve the similar sub band decomposition as that of contourlet but without the down samplers and up samplers in it [8]. The NSCT construction can be divided into two parts where one part demonstrates the non sub-sampled pyramid structure, which splits the input into a low pass sub band and a high pass sub band .The other is non sub-sampled directional filter bank structure, which decomposes the high pass sub band into several directional sub bands as shown in fig.

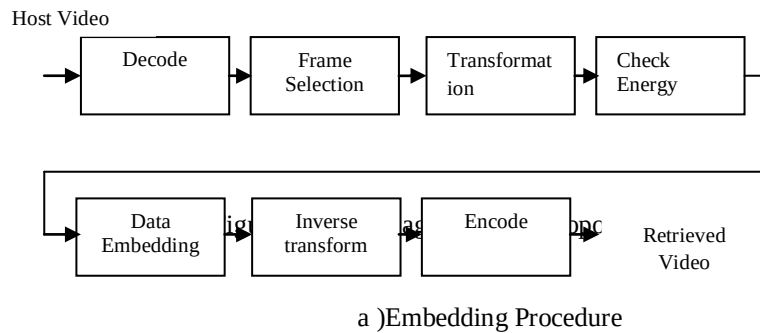


Fig.1. This process is iterated repeatedly on the low pass sub band outputs of non sub-sampled pyramids. Here, non sub-sampled pyramids provide multiscale decomposition and non sub-sampled directional filter banks provide directional decomposition

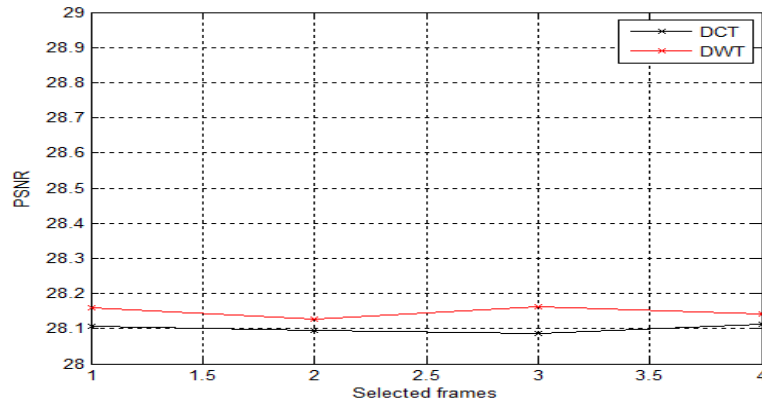


Figure 5: Performance analysis of the proposed scheme with respect to different selected frames and PSNR

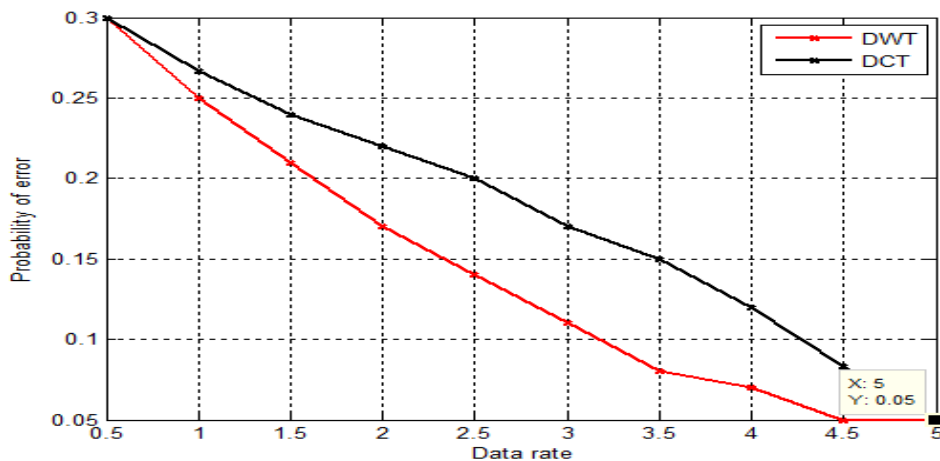
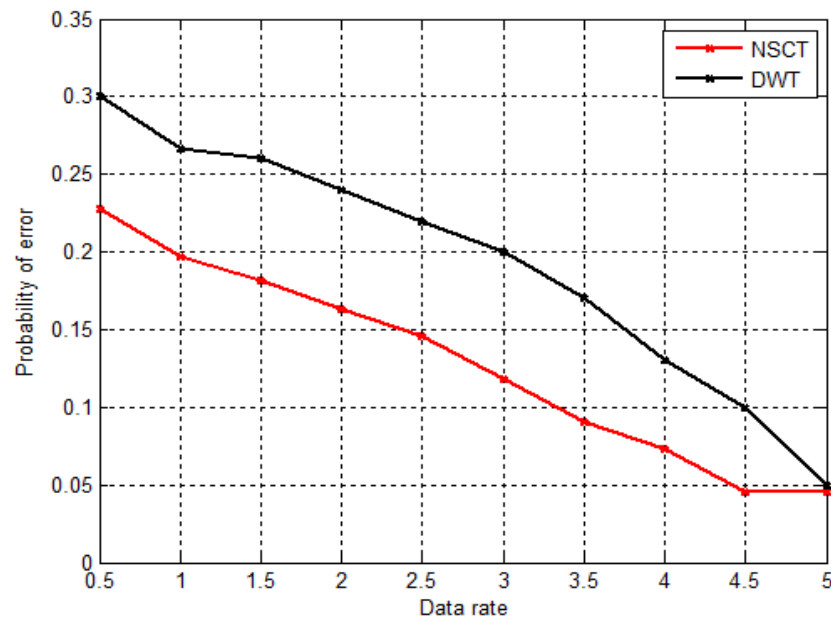


Figure 6: Performance analysis of the proposed scheme with respect to different data rates and the probability of error



V.CONCLUSION

Secure zone based selective data embedding scheme is proposed in wavelet domain .The method out performs than the existing DCT based approach with and increment of about 0.2dB of PSNR on average with a probability of error 0.05 decrement. It is here by concluded that the current scheme may be utilized for better selective approach. This work can be further extended with spreading codes and higher multi resolution analysis transformations.

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