A comparison Study, for Steganography, between Dark skin and White Skin tone based on Wavelet Transformation.

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استلام البحث : ١٨ / ١١ /٢٠١٨ قبول النشر : ٩ / ١٢ / ٢٠١٨

ABSTRACT:

Hiding information (Steganography), is the methodology and art of hiding any important information using any communication made like (Image, Sound clip, and Video). Here, it is not required to encode the secret data to send it but instead we hide it by the use of skin color as a sole image, and, because it is matchless features for an individual, that is what is called "Biometric Features". The cover image is a skin color image to embed the payload, the secret image is an X-ray image, and the use of DWT (Discrete Wavelet Trans.) decomposed confines of the cover image to routine it for the hiding the (stegoimage).

Keywords: steganography, Human Skin, Wavelet Transformation; Image

INTRODUCTIO :

Steganography is an art that enables you to secure the important data from being seen by a third unwanted person over the internet [1]. According to the statistic information, the user of internet is at great hazard when traffic their information on the website [2], and that is due to lose of the secrecy or privacy of personal information. We use the skin color to provide a suitable carrying media for the data [3]. Using the color in YC_bC_r color system to detect the skin is an important means to get the required area of interest out of the background of the image [4]. Then the Blue channel of the skin area is the less effected by the human eye(any change in the Blue channel is friendly to the human eye) [5]. In this paper we uses The Wavelet Trans. as the mean to get the high frequency of the skin color where the data will be hidden, in

the frequency domain to be applied on the Blue channel and emblements the data in it, the secret image will be under another stage of preprocessing where a Slantlet transformation on the gray scale image, under a certain level od decomposition to preform a high level of secrecy to the stegoimage that will be hidden.

1. **SKIN DETECTION USING YC_bC_r**

Mankind skin is a sole feature for every individual, and it is a secure place to hide data [5]. Where every person has its own color and that is what is call "Biometric Features" as well as the eyries and finger print [4]. By the use of an algorithm specially made to detected the skin in the YC_bC_r color system, to get an area of our chosen between two kind of skin (Dark and White) we can get the skin tone and remove the background of the image as shown in figure (1). In this step no transformation will be made for the image to get the required tone and prepare the area of interest for applying the Discrete Wavelet Transformation (DWT).

2. DISCRETE WAVELET Tran. (DWT).

The (DWT) is a well-known frequency domain transformation which is working with hiding and steganography under the preprocessing stage for the carrier media. In this transformation the image will be formed into for portions as fallow;

LL- is the Approximation coefficient.
LH- is the Horizontal detail coefficient.
HL-is the Vertical detail coefficient.
HH- is the Diagonal detail coefficient.

As we know that the human eye can recognize only low frequency , we will use the high frequency to hide the stegoimage. Before embedding, the secret image will be under the effect of DWT named Daubechies Wavelets (db1). In the HH level for the 2nd level of decomposition using will give the method more robustness under the attack of unwanted third person.

3. HADMARD TRANS.

The Hadamard Transf. is the best in accuracy, according to the statistic studies. The high frequency coefficients are less sensitive to falsehoods because of a rectangular basis [2]. The basis of the discrete cosine transformation is a real function and gives a round-off error, and that is because of the rounding, which it is not orthogonal. Thus, the Hadamard Trans. algorithm is more accurate and less sensitive to errors and distortions. And it fallow the equations:

For a symmetric Hadamard matrices $N=2^n$, the two-dimensional Hadamard trans. can be represented as a series

$$\boldsymbol{G(u,v) = \frac{1}{N}\sum_{j=0}^{N-1}\sum_{k=0}^{N-1} F(j.k).(-1)^{p(j,k,u,v)}} \quad .(1)$$

Where

$$P(j,k,u,v) = \sum_{i=0}^{n-1}(u_i.j_i + v_i.k_i) \quad .(2)$$

The variables are equal to the digits in the binary system of the numbers respectively [6].

Equation (1) can be represented by matrix multiplication as:

$G = F^* H_m$ (3)

Where H is the Hadamard matrix also can be calculated using :

$H_m = H_1 \otimes H_{m-1}$ (4)

Where H_1 :

$$H_1 = \frac{1}{\sqrt{2}}\begin{pmatrix}1 & 1\\ 1 & -1\end{pmatrix} \quad (5)$$

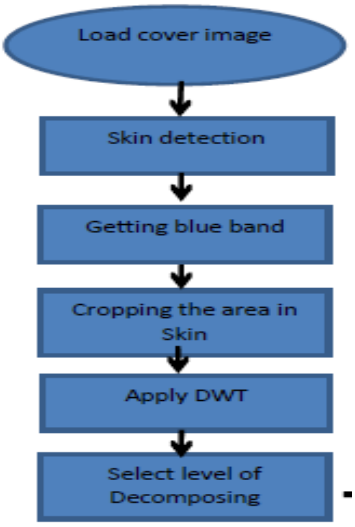
And $\otimes$ represent the Kroncker product which can be defined

$$H_m = \frac{1}{\sqrt{2}}\begin{pmatrix}H_{m-1} & H_{m-1}\\ H_{m-1} & -H_{m-1}\end{pmatrix} \quad (6)$$

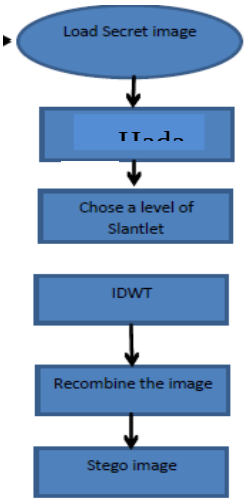
For conversion, the block size was 8x8, in contrast to the analogue [6]. This block size is widely used in compression algorithm based on pre-formation.

4. PROPOSED WORK.

1- COVER IMAGE



2- SECRET IMAGE



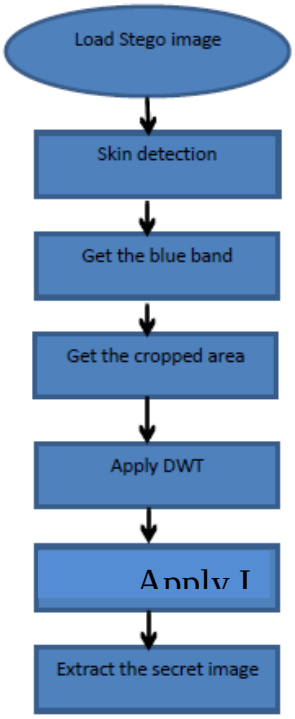
Cover image pre-processing for both images of Dark Skin and White Skin

1- Load the cover image
2- Apply skin tone detection
3- Getting the Blue channel
4- Select the proper area for embedding
5- Apply DWT on 1level on Blue channel

Secret image pre-processing

1- Load image
2- Gray level the image.
3- Apply Hadamard trans.
4- Embed the data by adding it to the selected area.
5- Apply IDWT.
6- Recombine the stego image.

3- Recover the image;



Cropped area size	PSNR	MSE
5*5	22.62	0.00546
7*7	22.7	0.0053
9*9	17.9	0.0161
11*11	14.8	0.033
13*13	13.8338	0.041
15*15	9.675	0.1077
17*17	7.391	0.18231
19*19	11.211	0.07566
21*21	9.73676	0.10625
23*23	6.3766	0.23
25*25	6.605	0.21844
27*27	5.634	0.27323

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1- Stegoimage loading.
2- Skin detection is applied
3- Get the Blue channel
4- Go to the area of inters
5- Apply DWT to get the secret image
6- Apply iHadamrd
7- Recover the secret image.

5. EXPERMENTAL RESULT

When the proposed algorithm is applied on the dark skin image the result was as shown in the table
For the Dark skin is
And for the White Skin is :

7-CONCLUSION.

When applying the algorithm for the two images for the detection and for the embedding, a good result for the skin detection was gain, and more for the embedding of the data for the Darker skin, and that is due to the colors of the dark skin where the frequency of that colors are low and the adding process according the algorithm incres the the frequency for a bit that didn't affect the PSNR and MSE of the original image. The given data shows that the hiding of the data is better in the darker skin than the white skin, and the smaller the area of embedding the greater result was gained.

REFRENCE

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