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A New Perspective in Steganography Technique

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***Abstract*— The Internet as a whole does not use secure links, thus information in transit may be vulnerable to interception as well. The important of reducing a chance of the information being detected during the transmission is being an issue now days. In this paper, I clarify what steganography is, the definition, the importance as well as the technique used in implementing steganography. Here I proposed a new algorithm ALSB (Advance Least Significant Bit) that overcome the disadvantages of currently available algorithm for image steganography.**

***Keywords*— Steganography, ALSB, Stegano - function**

INTRODUCTION

There are many possible ways to transmit data using the internet: via e-mails, chats, etc. The data transition is made very simple, fast and accurate using the internet. However, one of the main problems with sending data over the internet is the "security threat" it poses i.e. the personal or confidential data can be stolen or hacked in many ways. Steganography is a technique of hiding information in digital media. The word "Steganography" is of Greek origin and means "covered or hidden writing". Some algorithms are available for steganography purpose but they have some limitations like not supporting all the formats of file, not supporting to color image specially 24-bit etc.In this paper I proposed a new algorithm ALSB(Advance Least Significant Bit).This algorithm is different from LSB algorithm and specially for 24-bit color image.In ALSB I have embed 4-bits of each pixel of secret message to 4-bits of each pixel of cover image with the logic of ALSB to get the stegano-image.The upcoming sections will introduce the logic of ALSB, results of ALSB and comparing those results with existing steaganography techniques.

A. 24-BIT COLOR IMAGE

In[1],24 bit color image is best define by RGB color model in which each color appears in its primary spectral component of red, green and blue. This model is based on Cartesian coordinate system shown in Fig 1. In which RGB primary value are at three corner ,the secondary color cyan , magenta and yellow are at three other corner, black is ate the origin and white is at the corner farthest from the origin. Line joining the two corners has equal values for red, green and blue.

This produces various shades of grey. The locus of all these points is called the grey line. In RGB model, each pixel is composed of RGB values and each of these colors requires 8- bit for its representation. Hence each pixel is represented by 24 bits. So total number of color possible with 24-bit RGB image is (28)3 = 16,777,216.

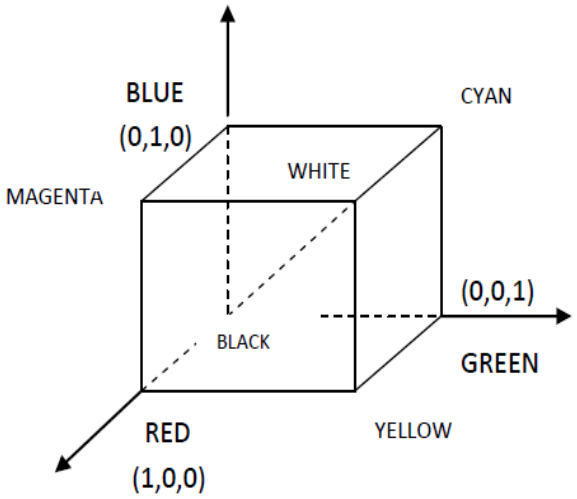


Fig 1 Schematic of the RGB color model,[1]

B. LEAST SEGNIFICANT BIT

LSB based technique is most simple and straightforward approach in which message bits are embed in least significant bits of cover image. In LSB steganography, the least significant bits of the cover media's digital data are used to conceal the secret message. LSB Steganography can be classified by two methods LSB replacement and LSB matching. The terminology LSB replacement/ LSB matching was firstly discussed by T. Sharp. First is LSB replacement which is simplest of the LSB steganography techniques. LSB replacement steganography replace the last bits of cover image with each bits of the message that needs to be hidden.

C. PROPOSED ALGORITHM

In this paper I proposed a new algorithm calls ALSB(Advance Algorithm).This algorithm is providing good results specially in 24-bit color image. In ALSB I have embed 4-bits of each pixel of secret message to 4-bits of each pixel of 24-bit cover image with the logic of ALSB to get the stegano-image. This proposed algorithm has three main modules.

(1) Embedding Phase
(2) Transmission phase

(3) Extraction Phase

The basic block diagram of this algorithm is shown in figure 2.In which when sender wants to send a secret message to recipient then first he/she will embedded the message to cover image by applying stegano-function and unique key to the cover image which is the logic of ALSB. After applying stegano-function to cover image it becomes the stegano-image which is traverse through transmission medium to reach the destination. At the destination end the stegano –image is extract by applying inverse stegano-function and unique key to the stegano-image to get the secret message. Here unique key is use to both sender and recipient for providing more security to the message. The key is given by the sender and key is unique to both the side which is known only by sender and recipient.

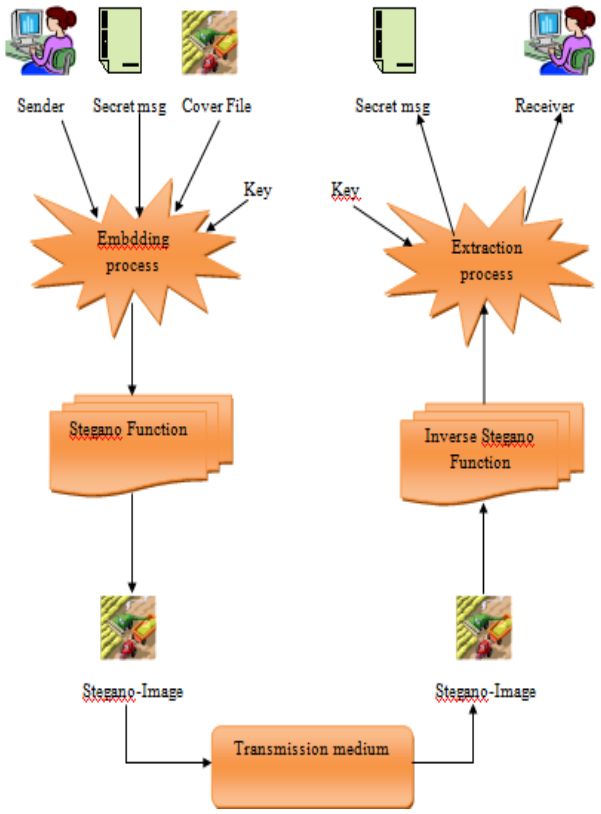


Fig 2

D. WORKING OF PROPOSED ALGORITHM

In this proposed algorithm, first remove last four bits of pixel's matrix of cover image(For R and G matrix) For Example: Let us consider given a row of m x n matrix as shown below. Now ANDing with 0XF0 we can remove last four bits (which contains negligible information) to store the data of secret file.

After that obtain the matrix of secret message. The secret file can be text file(.txt) or image file(.jpg,.jpeg,.bmp etc.) which is to be converted into binary form. We can obtain 8 bit data which needs to be converted into nibble, so that we can store it in the lower nibble of the pixel

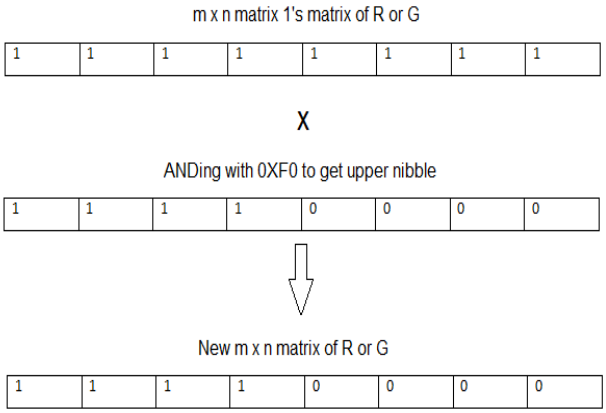


Fig 3 Apply ANDing to cover image

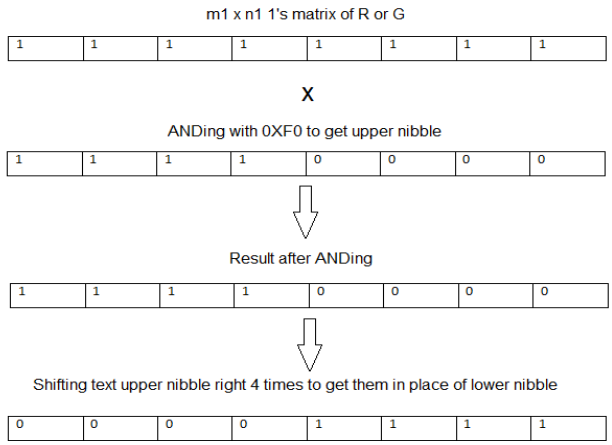
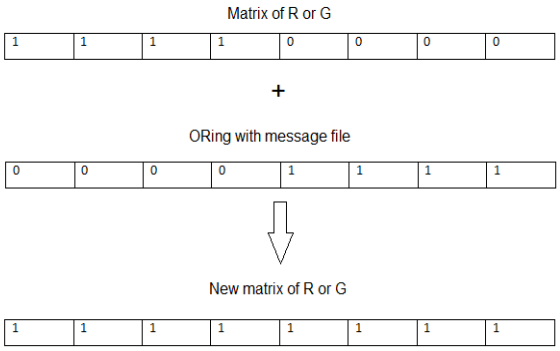


Fig 4 Apply ANDing to secret image

In above figure first take the matrix of secret message m1xn1 then by applying AND with 0XFO we get 11110000.Now apply right shift 4 times to the resultant nibble we get 00001111.

To obtain Stego image the new row of m x n matrix of R or G is ORed with a row of m1 x n1 matrix of the Secret file as shown in the figure below:



In above figure the resultant matrix 11111111 is our final matrix of stegano image.In that matrix 4-bits of cover image and 4-bits of secret message are stored.

E. IMPLEMENTATION AND RESULTS

I have choose MATLAB for my implementation

Fig 6 Cover Image

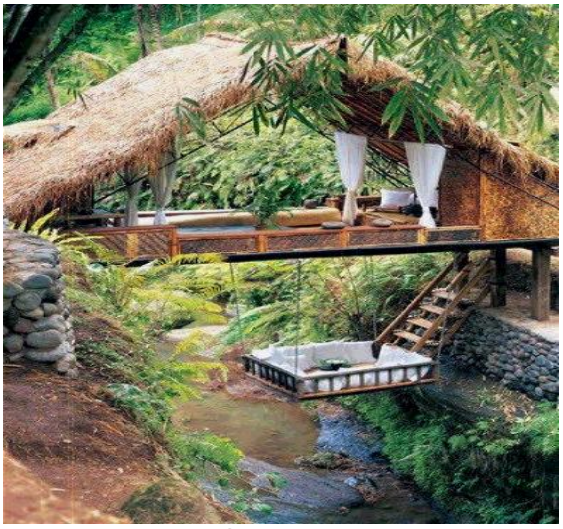


Fig 7 Stegno-Image

In above figure, fig 6 is cover image and after embedding a secret message of 4KB to the cover image we get the resultant stegano image that is shown in fig 7.The stegano image has MSE(Mean Square Error) is 4.32697e-009 and PSNR(Pick Signal to Noise Ratio) is 83.6382.

F. CONCLUSIONS

LSB algorithm is useful algorithm for sending message securely from source to destination but it is limited to some format of file and providing good results only in 8-bits color image[1]. Advance LSB is supporting all formats image with maximum security as before message is embed in to the image file its get encrypted. ALSB is providing good results in 24-bits image file.Here secret key technique is used where both sender and receiver has same key to encrypt and decrypt the message. So it is difficult for third party to embed the secure message from sender to receiver.

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