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RESEARCH ARTICLE

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IMAGE HIDING USING EIGEN VALUES AND EIGEN VECTORS

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ABSTRACT
The field of information is advancing, there is a need for information security and protection such as image hiding applications are needed. Image hiding is a method of embedding secret image into cover image such that an intended observer will not be aware of the secret image. Secret image hidden in the cover image is called stego image. Many techniques in the data hiding are proposed. This particular field is called Steganography. in this paper, image hiding technique using Eigen values and vectors is proposed. In this method, the secret image is embedded in to cover image based on Eigen values and vectors. Inverse operation is performed on stego images to get reconstructed secret and cover images. The proposed method is superior in terms of quality and embedding capacity compared with existing method. Image metrics are used to measure the quality of stego images.
Keywords: Eigen values and vectors, Image hiding, Image metrics, Information security, Steganography.

I. INTRODUCTION

The word Steganography originates from the Greek "Steganos", which mean secured or mystery and – "graphy" mean composition or drawing. In this manner, Steganography mean, actually, secured composing. It is the workmanship and investigation of concealing data such its nearness can't be identified and a correspondence is going on. A mystery data is encoding in a way with the end goal that the very presence of the data is disguised. Combined with existing specialized strategies, Steganography can be utilized to do shrouded trades.

The goal of Steganography is covert communication. So, a fundamental requirement of this Steganography system is that the hider message carried by stego-media should not be sensible to human beings .The other goal of Steganography is to avoid drawing suspicion to the existence of a hidden message. This approach of information hiding technique has recently became important in a number of application area. This objectives of this proposed method is, to product security tool based on Steganography techniques. to explore techniques of hiding data using reference pixel and to extract techniques of getting secret data using multilayer module. Steganography sometimes is used when encryption is not permitted. More commonly, Steganography is used to supplement encryption. An encrypted file may still hide information using Steganography, so even if the encrypted file is deciphered, the hidden message is not seen.

Over the past few years, numerous Steganography techniques that embed hidden

messages in multimedia objects have been proposed. Steganography is the craftsmanship and study of imperceptible correspondence. This is proficient through concealing data in other data, along these lines concealing the presence of the conveyed data. In this way picture Steganography is a superior methodology than cryptography.

2. PRAPOSED METHOD

The secret image can be embedded into the cover image in such a way that existence or presence of secret is unknown to the unauthorized users. The proposed method involves dividing the secret image and the cover image into non overlapping blocks of size 8x8. The eigen values and eigen vectors of secret image blocks are found and the eigen values are normalized. The eigen vectors are added and subtracted to the cover image blocks, to get two stego blocks. The normalized Eigen values are added to same cover image blocks to form third stego block. These stego blocks are combined to form three stego images resulting in the secret image sharing phenomenon.

2.1 EMBEDDING ALGORITHM:

Step 1 Divide the secret image to be embedded and the cover image into non overlapping blocks of size 8x8

Step 2 Calculate Eigen values and Eigen vectors of the secret images blocks.

Step 3 Normalize the Eigen values.

Step 4 Add the normalized Eigen values to the cover image blocks to form first Stego-image blocks.

Steps 5 Subtract the normalized Eigen values to the cover image blocks to form second Stego-image blocks.

Step 6 Add the Eigen vectors to the cover image blocks to form third Stego-image blocks.

Step 7 All stego image blocks are combined to form stego images.

Secret image

Cover image

Stego image one

Stego image two

Stego image three

Figure 1 Resultant Images of Embedding Algorithm

2.2 EXTRACTION ALGORITHM

Step1 The Three Stego's formed are divided into Non Overlapping blocks of size 8x8 .

Step2 Using these stego blocks reconstruct the secret and cover images without any loss of information.

Step3 Add the stego one and stego two to get the cover image block then subtract the cover image block from the Stego one to get the normalized Eigen values.

Step4 Subtract the cover image block from third stego to get Eigen vectors..

Step5 Calculate the inverse Eigen vector block using inverse operation.

Step6 Renormalize the Eigen values of the stego block.

Step7 Secret image sub blocks are recovered by using the formulae

Secret image block=inverse Eigen vector*Eigen values*Eigen vector.

Step8 The secret sub blocks and the cover sub blocks are combined to form reconstructed cover image and the Secret image.

Stego image one

Stego image two

Stego image three

Reconstructed cover image

Reconstructed Secret image

Figure 2 Resultant Images of Extraction Algorithm

III. EXPERIMENTAL RESULT

In this proposed method Lena and camera man is taken as cover and secret images respectively with a size of 512x512. The qualities of the reconstructed images are measured by using image metrics are presented in below Table1. Proposed method is well performed in terms of quality compared with the existing method is presented in below table2..

TABLE1: PERFORMANCE ANALYSIS AND RECONSTRUCTED IMAGES

Image metrics	stego image 1	stego image 2	stego image 3
Mean Square Error(MSE)	0.053267	0.099836	0.099836
Peak Signal to Noise	60.866	58.1379	58.137928

Ratio(PSNR)			
Average Deviation(AD)	-0.026517	-0.000333	-0.000333
Structural Content(SC)	0.999637	0.999982	1.000007
NK(normalized cross correlation)	1.00018	1.00006	0.999994
Maximum Deviation(MD)	0.969214	0.969474	0.969474
Laplacial Mean Square Error(LMSE)	0.000595	0.00828	0.000828
Normalized absolute Error(NAE)	0.00237	0.002619	0.002619

TABLE 2: COMPARISON OF PROPOSED METHOD WITH EXISTING METHODS

Cover image	Secret image	LSB	OLSB	OPAP	BA	TA	Proposed method
Camera man	leena	31.94	32.71	34.83	41.2	56.87	59.13

IV.CONCLUSION

It can be concluded by the experiment that, the secret image can be embedded in the cover image by using Eigen values and vectors. Proposed method gives best PSNR than existing schemes which is evident from the quality of stego images. Therefore the security of information is assured to a considerable extent. We conclude that , the proposed method is an efficient and easier approach for image hiding compared with existing methods.

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