Comparative analysis of PSNR on various bit-planes of an Image using MATLAB

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Abstract— Watermarking has been widely famous since past some years. As the threat to protection and copyright is increased, so in order to provide security to the digital documents various methods are used and watermarking is one of them. Through watermarking it is possible to protect the documents and if in any case any changes had done with original data then there comparison with their different bits and that tells us about the document. This paper elaborates about the various effects during changes in the bits of a watermarked image and to calculate the PSNR of the images. Through this paper we try to calculate the best PSNR from the various watermarked images at various bits.

Keywords — Watermarking, PSNR, bits ,compression, wavelets

I. INTRODUCTION

 Digital watermarking is the act of hiding a message related to a digital signal (i.e. an image, song, video) within the signal itself.[1]Digital Watermarking is a technique which allows an individual to add hidden copyright notices or other verification messages or even classified information to digital media.[2] Actually the digital watermarks are parts of the digital information which gives a brief idea about the image .This information can be anything. The information is hidden by using some algorithm, and identification is only known to the owner, and if case of illegal documentation is received then the buyer is involved.

Security is the important and sensitive topic today. So different techniques and algorithms are developed to overcome this problem. Watermarking is not an old concept but it had been used since when the online transfer of data had started, when any information i. e, image, audio , video has been sent from one to other(sender to receiver) then it is necessary to maintain confidentiality and originality of a document ,that there should be no change in the document at which had sent, so to maintain the originality and confidentiality there is need to add some kind of information which is known only to the sender and the receiver, and if any type of attack is applied on the document then it should be recognized to know about document. So there is a way by which we can sent the data/information being covered according to the document. And this way is known as "*watermarking*".

II. Proposed Algorithm

Watermark algorithm:

   To get the information that the data (information) which had sent is reached securely, then to check the correctness of image following proposed scheme is used. Using the scheme and when watermark is applied then psnr is calculated using the following formula:

PSNR =10*log10((255)^2/var);
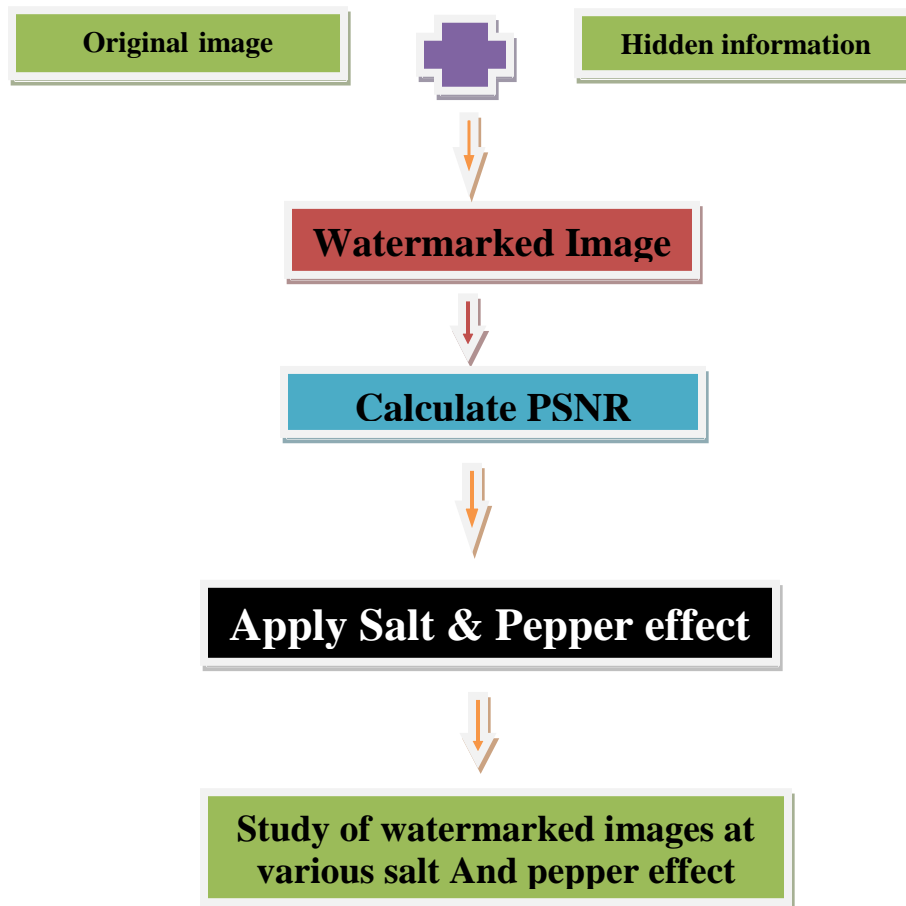**where var= s/size_host;**

With the help of attained PSNR it would be easier to know that which image has the best PSNR at which bit.
In the following discussions various values are calculated which are explained in the following section. This paper shows the comparison of PSNR values of various images along with their watermarks at different bits, and in this paper comparison work has been done using 5th, 6th, 7th, and 8th bit.

Watermark Scheme to calculate PSNR:

   With the help of following diagram it could be easier to understand the work done by me. Let us understand the proposed work with the help of following steps:
   1.   Take an image
   2.   Choose a watermark to hide in it

3. Watermarked image has obtained
4. Calculate the PSNR
5. Repeat the steps1-4 for 5th, 6th, 7th, and 8th bit
6. Again calculate the PSNR for the images at various bits
7. Compare and find the bit

Original image		Hidden information

Watermarked Image

Calculate PSNR

Apply Salt & Pepper effect

Study of watermarked images at various salt And pepper effect

Fig: watermark scheme

III. Experiment and Result

With the help of above scheme, similarly all the effects and changes had been done on various images. But in this paper we will compare with two images,

After showing the mandrill images with different bits, we will show it also by the other image i. e, cameraman image, which is as follows. For the experimental results and to perform check two images are taken as input and then their PSNR values are compared and from result we conclude the best clarity image.

For the study of PSNR of various images at different bits we have to take various images and then compare their PSNR at various bits, due to which it would be easier to get the image with highest PSNR i. e, image with the best clarity.

Let us start the comparison, first of all image of mandril is taken for experiment. And here is the table of values.

1. **For mandril:**

First of all the image the image of mandril is taken for experiment, through which I try to conclude result, the various images are:

Number of Bit	Value of Row	Value of Col	Value of key1	Value of Key2	PSNR
5	512	1536	512	1536	33.1046
6	512	1536	124	486	41.2286
7	512	1536	470	2028	45.1270
8	512	1536	124	486	53.2513

Fig: Experimental results using mandril image

The above table shows the comparison of the image on its various bits and the comparison shows that as the number of bits increase the PSNR also increased. And the quality of an image is at best at its highest bit i. e, at 8th bit. In the next section the comparison is shown with the help of images.
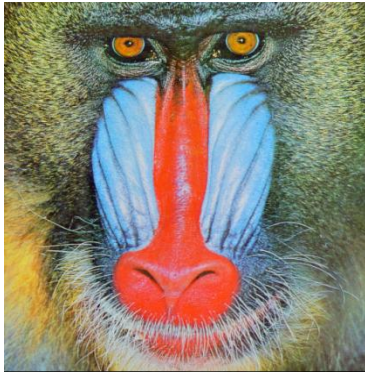

Fig: Mandrill (Original) with PSNR=22.77
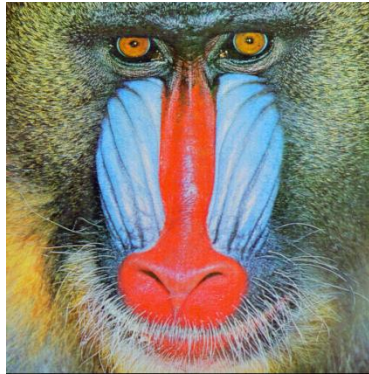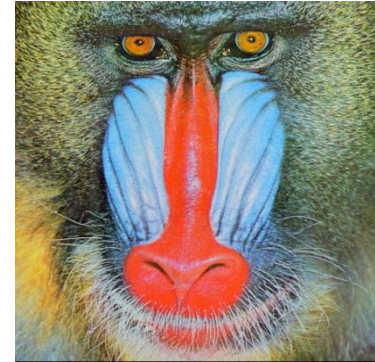

Fig:5th bit watermarked image with PSNR=33.10
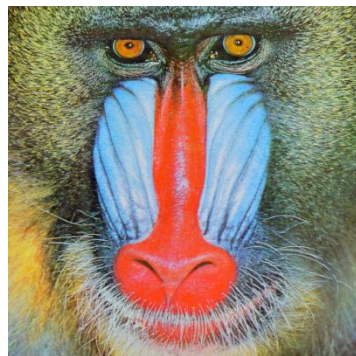

Fig:6th bit watermarked image with PSNR=41.22
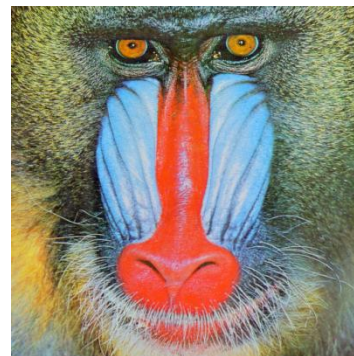

Fig:7th bit watermarked image with PSNR=45.12

Fig:8th bit watermarked image with PSNR=53.25

2. For Cameraman:

After the comparison of mandril image at various parameters it is concluded that 8th bit is best for image quality and PSNR is calculated through which the clarity is obtained. Now, to check the compatibility and correctness of our program, we are trying to do the same methodology on a different image, so for this purpose image of cameraman is taken and in the same manner its values are calculated which are described below:

Number of Bit	Value of Row	Value of Col	Value of key1	Value of Key2	PSNR
5	225	675	102	306	33.0755
6	225	675	204	612	39.3028
7	225	675	512	1536	45.1791
8	225	675	197	768	51.1399

Table -1 Experiment Result For cameraman image

The above table shows the comparison of the image on its various bits and the comparison shows that as the number of bits increase the PSNR also increased. And the quality of an image is at best at its lowest bit i. e, at 5th bit. In the next section the comparison is shown using images.

Fig: Camera man(original) with PSNR=33.26

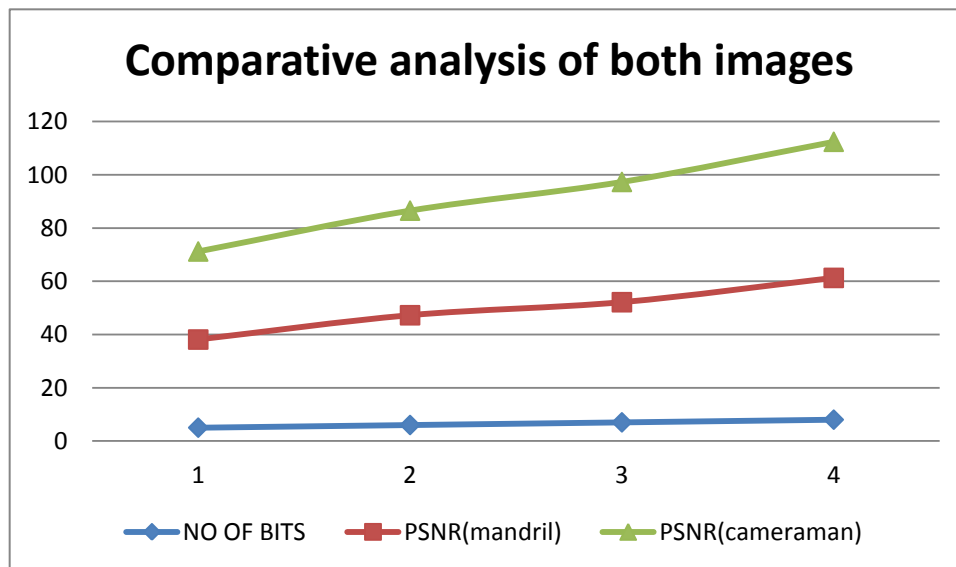Fig: 5th bit watermark image with PSNR=33.07

Fig: 6th bit watermark with PSNR=39.30

Fig: 7th & 8th bit watermark with PSNR=45.17 & PSNR=51.13

Comparative analysis of both values of PSNR:

As shown from above chart it is clear that both images have the same values of PSNR at same bits and at the 8th bit the PSNR value is highest.

IV.CONCLUSION

On comparing different values of both the images at various bits using their PSNR values it is concluded that at 5th bit the image was not so clear but after done of experiments at various levels i. e, at various bits it is concluded that image at the 8th bit has the highest PSNR and has the highest clarity either compare to its original image or compare with other image,

Correctness is checked using the second image, which concludes that image at the 8th bit has the highest PSNR which shows the highest level of clarity of an image

V. REFERENCE

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