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Reversible Watermarking on the basis of Invariant Image Classification and Quality Preservation by Histogram Modulation

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***Abstract*- The concept of reversible watermarking has been designed to achieve complete restoration of the image after its removalafterthe insertion of data in various part of the image.This originally is based on identifying parts of the image which are watermarked using two different Histogram Shifting (HS) modulations. One is Pixel Histogram shifting and other is Dynamic Prediction Error Histogram Shifting(DPEHS).In this paper a good PSNR ratio of about 1-2 db could be achieved.The first most important technique is the Histogram shifting modulation(HS),which accordingly consider and handles the local specifications of images**

Keywords-Psnr,EE,DPES

I. INTRODUCTION

. Watermarking is a technique which is used to hide data into images. It can be of various types-Text watermarking,Image watermarking,Audio watermarking and Video watermarking.Hence data can be in any of these four forms.The watermarking technique can be categorized into two types:

- Visible
- Invisible

A watermark is defined as a translucent image or text on the primary(original) image.This makes possible for the original image to be viewed maintaining the copyright protection. Generally for the data in digital format visible watermarks are preferred for strong copyright protection.The inserted image which can be viewed with human eyes is called as invisible watermark.The copyright ownership can be identified with the help of only a few devices or special software by extracting the hidden data.

Reversible watermarking is data hiding method which is known of as embedding secret message in another image or data file without losing the original data. Reversible watermarking technique provides its users the facility to obtain the primary(original) image out of its watermarked image after the watermarking has been removed.When hidden data is involved histogram shifting can be used in recovering the primary image without any loss.The prediction has been used in the introduced technique and prediction-errors are generated to get likeness of pixels in their neighborhood. Hence this helps to update the watermark content. Here is the technique.

Expansion Embedding's basis was first introduced by Tian in [1], which has been later generalized by Bao[2].Another area where expansion embedding can be applied is in pixel prediction error.A famous HS has been Introduced which is related to single histogram maxima and minimum, and shifting of all pixels between those ranges. There are various Watermarking and Reversible watermarking necessities based upon various attacks for example-Low pass filtering , Geometric , Vector quantization ,which are as follows -

a) Security

b) Imperceptibility

c) Capacity and ,

d) Robustness

II. EXISTING SYSTEM

There are various methods proposed for reversible watermarking but the two modern technologies are Expansion Embedding modulation(EE),Histogram shifting or both can be used at a time for watermarking of images.Expansion Embedding was introduced by Thodiet[7].(EE) Expansion Embedding modulation uses the Least Significant Bit algorithm-it means data is hidden in the least significant bit of image.

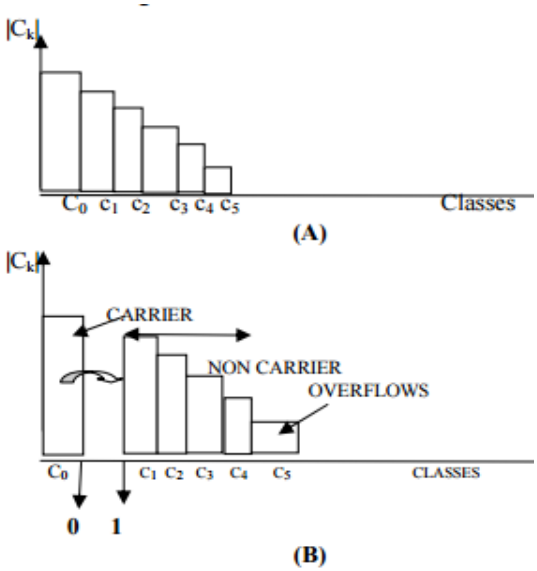

Fig. 1 Histogram Shifting Modulation. (a) Orig Histogram. (b) Histogram of the Watermarked

What actually happens in histogram shifting is that gray values are added to some pixels because of which a particular range or set of different classes of the histogram of the image is repositioned and a 'void' near the histogram maxima is generated.The pixels making up the class of histogram maxima called carrier class are transferred to the void or remained as it is,so that one bit of the message '1' or '0' can be encoded .the rest of the pixels called 'non carriers' are moved. Maximum times the image histograms are aggregated around a single class maxima which is located on zero. Because of this the capacity of histogram shifting(HS)is maximized .Moreover at the extraction stage the re-identification of histogram classes with maximum number of elements is simplified. To lower the alteration in image while the capacity is being preserved,a few techniques have been provided to find transform coefficients,some errors or pixels which are not part of the maxima classes of histogram(non carrier).Normally maximum number of different techniques depends on prediction errors where pixels are not watermarked in the vicinity of high variance.The pixels belonging to classes of histogram shift without embedding of the message.It has been proposed that to minimize image modification,for a particular capacity,the certain group of carrier classes can be used.The time taken to execute for this approach is high.

III. Proposed System

In the proposed system, the image's local characteristics select the carrier class dynamically. Generally for the message introduction process we need to calculate the native locality of every error predicted so far. It depends on choosing the lossless-modulation which has been altered . This specially goes for the medical images in which large dark(black) areas are present known as the background area. When Histogram shifting is applied directly on the pixels of these regions, it would become more effective with smaller complexities rather than applying on error predicted. The maxima in the Histogram is equal to the void gray value. Its potential can be raised by drifting the pixels to its right side stating that positive gray values which are hidden are easily quashed . Thus the management of underflows and overflows seems to be a quite difficult task when dealing with the prediction errors of these areas as the value of the shift amplitude can be either negative or positive.Thus by observing the local content of the image locally modified ,lossless modulation is selected. Thus. the proposed system allows us to optimize the compromise capacity or image deformation

Benefits :-

•Histogram shifting on pixels are more powerful and causes low difficulty rather than trying it on errors' prediction
•The extractor and embedder should remain in coordination as same source image would get regenerated by the extractor.
• It provides robustness
•The image in the proposed model is protected very well
•It is useful for better pixel prediction

IV. Process Diagram

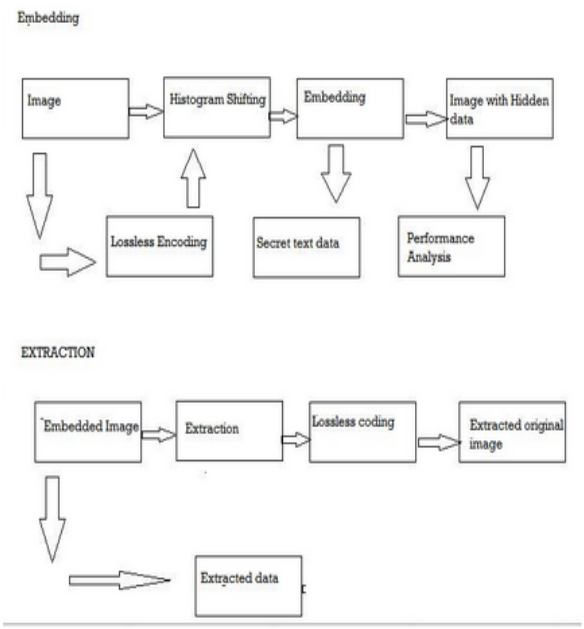

Fig. 2

In [3], they have introduced a reversible watermarking algorithm in which we have hidden the data by embedding 10-80 kb of data for an image of size 512*512*8. The algorithm we have employed depends upon Histogram Shifting modification which has altered in the original image's domain.

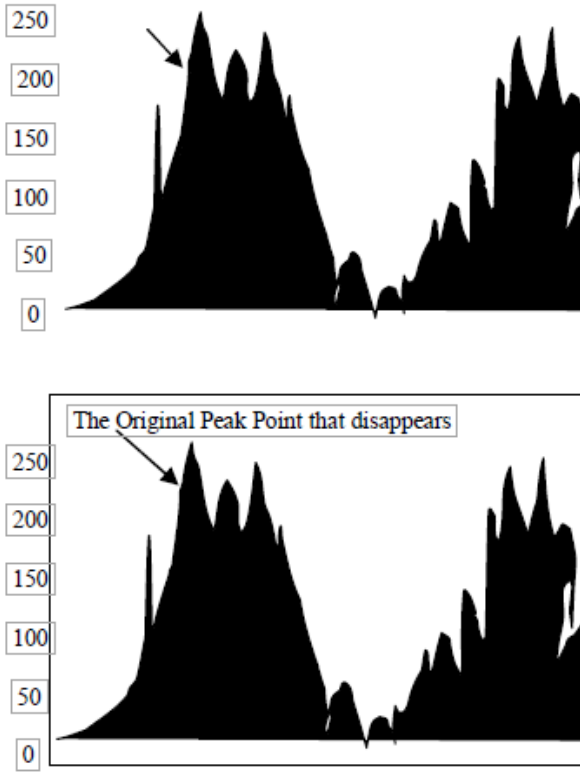

Fig 3.(a) Image Histogram (b) Watermarked Image Histogram

The histogram of the original image which is shown above the algorithm would find a zero point which means it has no value in the original image 's gray level . In Figure 3(a) the peak point is obtained from h (154) and h (255) gives the zero point. The number of bits that can be entered depends upon peak point's frequency value.

The first step in the embedding process is to increment the value by 1 for the value of the pixels between 155 and 254. The value 155 would be left empty when histogram range is made to right shift by 1. In the same continuous order current image would be scanned and when a value of 154 be encountered and if data's bit value to be embeddedcomes out to be 1 ,those values would get increased by 1 and making the pixel value would remain intact for other values. In Figure 3(b) the same image's histogram is shown. Let 'p' be the peak point and 'q' be the zero point in the marked image and p < q.The watermarked image would be scanned by the algorithm in sequential order.

The pixels whose gray scale value p+ 1 if met then bit '1' is extracted and the pixels whose values a is met then bit '0' is extracted. For the utmost point and minimum point's one pair the algorithm which is explained above is applied .Many pair can be understood as like many iteration of the technique for a single pair. The algorithm's benefits explained above is its low computational intricacy. Also the results of the experiment shows that the entire performance of the technique proposed is more considerable than other reversible watermarking techniques.

V. Implementation

During implementation we will come across various modules that will be useful to us. These modules include 1)User module 2)Invariant Image 3)Histogram Shifting Modulation 4)Reversible Watermarked image

In user module, authentication of the user is done first so he can proceed into the secret data sharing. The user interface is basically divided into two phases:-a)Embedding phase in which we will embed our secret message behind the image. b)Extraction phase in which we will recover the original message from the image.

In invariant image module we will split the image into 6 small divisions and in each of these divisions we will keep our secret message and hide it. Also in the recovery process we will require all these divisions to prove the authenticity and to recover the original picture by combining all of them.

In Histogram shifting module we will employ the pixel histogram shifting. Histograms are basically the tonal distribution of the pixels of an image. Modulation is basically done on the basis of pixel image histogram. This will further help in identifying those sections of the image that undergo watermarking with the best possible reversible watermarking.

At last, in Reversible Watermarked Image module we will make sure of the fact that there is synchronization between the watermark embedder and extractor for image restoration and removal of message .Also this will help in proving the quality of the image and its capacity for various different domain of images.

Conclusion

Reversible watermarking is adata hiding method which is known of as embedding secret message in another image or datafile without losing the original data. Reversible watermarking technique gives its users the facility to obtainthe primary(original) image out of its watermarked image after the watermarking has been removed.When hidden data is involved histogram shifting can be used in recovering the primary image without any loss.

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