REVERSIBLE DATA HIDING BY HISTOGRAM MODIFICATION FOR IMAGE CONTRAST ENHANCEMENT

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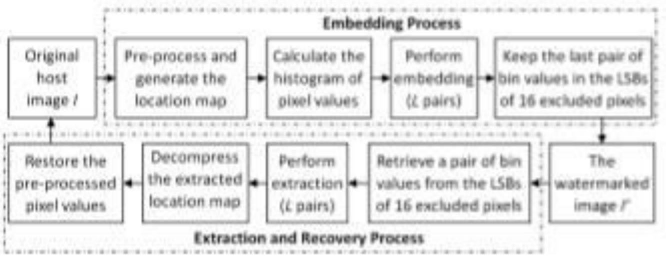
Abstract - Security is vital while transferring data over the network. The data is hidden in the encrypted image for the purpose of improving security.. This in turn improves the confidentiality of the data. The data embedded can be extracted without any error, and also the cover image can be restored with error free. This type of technique is termed as Reversible Data Hiding (RDH). We are conducting a survey in this paper based on different RDH techniques, where the original image can be recovered without any loss. If combine both lossless and RDH techniques, one part of data can be extracted before image encryption and another part can be extracted after encryption.

Key Words: : **Reverse data hiding, Reversible watermarking, Reversible contrast mapping peak to signal Ration (PSNR), & idquo , comulation ftn , & rdquo.**

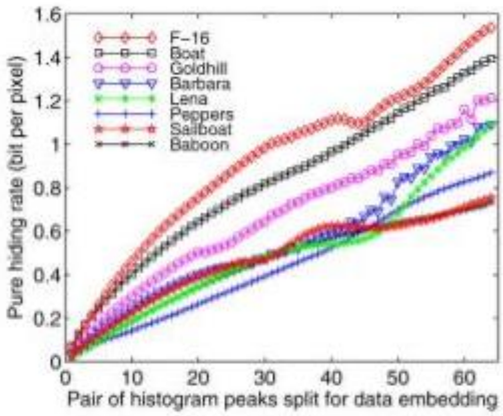
1.INTRODUCTION

The reverse data hiding keeps low distortion and helps in achieving high embedding capacity. This embedding capacity can be enhanced by coupling the simplified expansion method and simplified location map. But the main draw back is that it keeps same level of distortion, hence a new framework has to be designed as RDH cannot be embedded in encrypted domain directly as the correlation between pixels in the neighboring cells will disappear. These pixels in plain image are divided into blocks of size m x n. Along with an encryption key the key streams are generated where pixels are maintained at same size of m x n followed by a random permutation with the aid of a permutation key.



technique becomes inapplicable in some pairs of pixels even after removing the LSBs of the transformed pixel. The proposed RCM technique has a high embedding information as no additional data compression methods are needed. In another form of reverse watermarking , entropy masking is clubbed with the shifting of histogram. Here a universal watermarking algorithm with the characteristics and robustness of the watermarks' is proposed. In watermarking, the watermark is made visible in one form and in another form, the image is applied with watermarks that is, videos are made invisible. Thus this process is popularly called digital watermarking.

Normally for natural images, the difference between pair of adjacent pixels are either equal or zero, but in reversible data hiding based on statistical difference a histogram is constructed. During embedding level, zero points are used for data extraction and image recovery stage.



In RDH algorithm, quality of host images are enhanced by keeping PSNR ratio high. Here, for data embedding the highest two bins are selected so that histogram equalization can be performed by repeating the process. To make the original image reversible, the side information along with the message bits are also embedded into host images.

Fig. 3. The original and contrast-enhanced images of "Lena" by splitting 10, 15 and 20 pairs of histogram peaks in the proposed algorithm. (a) Original image of "Lena". (b) 10 pairs: 0.185 bpp, 29.10 dB. (c) 15 pairs: 0.268 bpp, 25.97 dB. (d) 20 pairs: 0.345 bpp, 24.91 dB.

4. The original and contrast-enhanced images of "Goldhill" by splitting 15 and 20 pairs of histogram peaks in the proposed algorithm. (a) Original ge of "Goldhill". (b) 10 pairs: 0.299 bpp, 30.64 dB. (c) 15 pairs: 0.411 bpp, ›2 dB. (d) 20 pairs: 0.506 bpp, 24.64 dB.

Literature Survey:-

J. Tian proposed that the difference expansion transform has contributed a remarkable break-through in reverse hiding schemes and information security. It helps in keeping low distortion and high imbedding capacity . The simplified expansion method coupled with the location map and new expandability achieves more embedding capacity while keeping same level of distortion as the original expansion method.

Z. Ni ,Y. Q. Shi, N. Ansari, and W. Ssu advocated that RDH can't be embedded in encrypted domain's after encryption the correlation between pixels in the neighboring cells will disappear. In this paper, the pixels in the plain image are primarily divided into blocks of size m x n .For encryption the key streams along with an encryption key is generated while the pixels are maintained at the size m x n. This is then followed by a random permutation done with the help of a permutation key. Thus this scheme maintains the correlation between the neighboring cells of each sub block. This paper has the main advantage of applying RDH scheme without the aid of any image encryption algorithm, meaning that the manager at the server side can apply the enormous RDH algorithm directly to encrypted domain to accomplish data hiding without the notion of a new RDH scheme.

In reversible watermarking the host signals without the loss of any useful information is embedded. Even though data embedding technique is with a high capacity, at low embedding capacity it results in undesirable distortion. It also leads to lack of capacity control as it requires a location map. To overcome this, a histogram shifting technique to embed location map is advocated. The distortion performance at low embedding capacity and the problems of capacity control are fixed by the above technique. A new policy of data embedding technique called prediction-error expansion is also proposed. This has a better idea of exploiting the inherent relations between the neighboring pixels. The prediction-error expansion plus histogram shifting is combined to form an efficient data embedding technology. The maximum embedding capacity compared to difference expansion is doubled, which is evident from experimental results of many standard test images. Also at moderate embedding capacity, the quality of watermarked is improved materially. The above doctrines are proposed by D. M. Thodi and J . J . Rodriguez.

In RCM or Reversible Contrast Mapping ,a simple integer transform is applied to pixel pairs. But in some pairs of pixels even after LSBs of the transformed pixels are lost, RCM is quixotic. The proposed reversible water marking scheme of spatial domain has a high embedded information bit rates. No additional data compression schemes in terms of mathematical complexity schemes are needed as it yields in lowest complexity. Even robustness against entropy can also be entrusted with.

Here V. Sachnev, H. J. Kim, J. Nam, S. Suresh, and Y. Q. Shi advocate an advanced form of reversible watermarking scheme where the entropy marking is clubbed with histogram shifting. One of the main characteristics of human visual system is that entropy marking is rarely addressed in visual models which marks the first contribution. Histogram shifting marks the second contribution which shows various histogram images. This paper proposes both ephemerability and robustness of watermark for a universal entropy marking model for watermarking embedding algorithm. Also optimal watermarking is calculated from experimental results.

In the paper presented by X. Li, B. Yang, and T. Zeng, a large number of images are found on the internet. With the advancement of information technology, there is a need to provide cover (security) for such data. In medical and military images when an intruder occurs, he/she may capture the core of the image causing distortion which is unacceptable. The technique of watermarking can be categorized into two types, where in 1st type the watermarks are made visible and for the 2nd type the images are applied with watermarks ie, videos, are made invisible and this technique is known as digital watermarking. This method can be applied for providing copyright protection to films, videos etc. As the digital watermarking is invisible, it is more secured. Hence even if an intruder view the content of the image, he/she can't identify the watermark present in the image. After the reception of the images, the original images are retrieved at the receiver side.

In the paper told by Z .Zhao, H. Luo, Z. M. Lu , and J.-S. Pan, a reversible data hiding method for natural images is proposed. The difference between pair of adjacent pixels are either zero or equal. In this model a histogram is constructed based on statistical difference. A multi level histogram mechanism of modification is employed in the data embedding phase. Compared to the conventional method based on one/ two level of modifications, for the peak points used for secret bits modulation, the histogram capacity is more. During data extraction and image recovery stage, zero points are used instead of peak points. For each pixel, a sequential recovery strategy is exploited which is reconstructed using the previously recovered neighboring cells. This in turn enhances effectiveness of the above method and results in superior performance.

H.T. Wu and J. Huang said that for digital images, an RDH algorithm is applied .This algorithm enhances the host image's quality by keeping PSNR ratio high. In this method for performing data embedding, the two highest two bins are selected so that by repeating this process histogram equalization can be performed. In this process, the side information is also embedded into the host image along with message bits so that the original image can be made reversible. To demonstrate efficiency this algorithm is enacted on two sets of images. The first algorithm to achieve image enhancement is known as RDH.

To satisfy various applications, reversible/ lossless/ distortion free /invertible visible marking scheme is proposed by Y. Yang, X. Sun, H. Yang, C.-T. Li, and R. Xiao. In this a visible watermark is expected to combat piracy of the copyright but can be removed to recover original image losslessly. The watermark images can be recovered transparently by overlapping it on a user specified region of the host image depending on the human visual system based on scaling factors. To restore watermarked area a reconstruction / recovery packet is used to achieve reversibility which is recoverably inserted into non-visibility watermarked region. The difference between original image and the approximate version is established. For the development of simple prediction technique, the use of unauthorized neighboring pixels are generated. For reconstructing the original watermark packet from the encoded packet, the recovery packet is encoded uniquely before hiding. Hence without the need of the availability of watermark, image recovery process is carried out. This method also adopts the idea of data compression.

For the purpose of histogram equalization, an adaptive image contrast enhancement scheme is proposed. But with minor modifications, different results can be obtained.& idquo, comulation ftn, & rdquo used for generating grey level mappings from local histograms is a key feature of this technique which is proposed by J. A. Stark.

3.CONCLUSIONS

Reversible data hiding in encrypt hiding in encrypted images provides double security for the data such as image encryption as well as data hiding. The existing systems contains some problems so we need to remove the problems by combining lossless and reversible technique means, data extraction and recovery of image are error free. The PSNR will be improved to get original cover image back. By combining lossless and reversible data hiding techniques, more advanced and efficient data embedding can be done in encrypted images.

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