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A Review on Reversible Data Hiding Scheme by Image Contrast Enhancement

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ABSTRACT
In present world demand of high quality images, security of the information on internet is one of the most important issues of research. Data hiding is a method of hiding a useful information by embedding it on another image (cover image) to provide security and only the authorize person is able to extract the original information from the embedding data. This paper is a review which describes several different algorithms for Reversible Data Hiding (RDH). Previous literature has shown that histogram modification, histogram equalization (HE) and interpolation are the most common methods for data hiding. To improve security these methods are used in encrypted images. This paper is a comprehensive study of all the major reversible data hiding approaches implemented as found in the literature.

.***Keywords*:** Contrast enhancement, Data hiding, Data security, Histogram equalization (HE), Reversible data hiding (RDH), Watermarking.

I. INTRODUCTION

Data hiding is a technique for embedding information into covers such as image, audio, and video files, which can be used for media notation, copyright protection, integrity authentication, covert communication, etc. Most data hiding methods embed messages into the cover media to generate the marked media by only modifying the least significant part of the cover and, thus, ensure perceptual transparency. The embedding process will usually introduce permanent distortion to the cover, that is, the original cover can never be reconstructed from the marked cover. However, in some applications, such as medical imagery, military imagery, and law forensics, no degradation of the original cover is allowed. In these cases, we need a special kind of data hiding method, which is referred to as reversible data hiding (RDH) or lossless data hiding, by which the original cover can be lossless restored after the embedded message is extracted. Fig.1 shows Simple model of Reversible data hiding (RDH) Message this can be done by selecting an encryption key which is use to encrypt the original information after encrypting the information data hiding key is used and this data hiding key is embedded on the encrypted information with the help of data hider block and this encrypted information containing embedded data is send on the channel .This will received by image Decryption that will decrypt the received data and by this decrypt information the original information is extracted by performing the reverse operation by using the same Encrypt key .

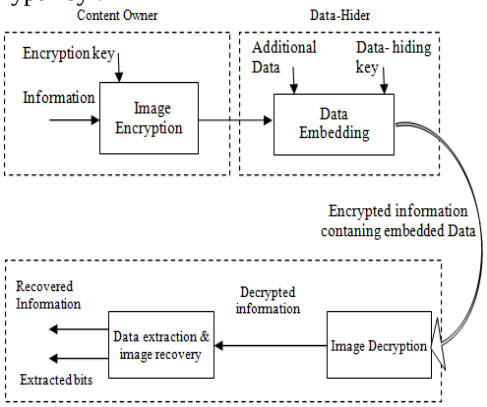

Fig. 1 Simple model of Reversible data hiding (RDH) Message

Recently, reversible data embedding techniques have drawn more and more interest. Existing methods can be classified according to the techniques associated with restoration. Some of the approaches rely on lossless compression to exploit the redundant space created by the compression operation The existing reversible data hiding algorithms, including some newest schemes, have been classified into three categories: 1) Those developed for fragile authentication; 2) Those developed for achieving high data embedding capacity; 3) Those developed for semi-fragile authentication. In each category, some prominent representatives are selected. To evaluate the

performance of a RDH algorithm, the hiding rate and the marked image quality are important metrics. There exists a trade-off between them because increasing the hiding rate often causes more distortion in image content. To measure the distortion, the peak signal-to-noise ratio (PSNR) value of the marked image is often calculated. Generally speaking, direct modification of image histogram provides less embedding capacity. In contrast, the more recent algorithms manipulate the more centrally distributed prediction errors by exploiting the correlations between neighboring pixels so that less distortion is caused by data hiding. Basic RDH technique used in different areas are: PWLC data hiding technique, DHTC data hiding technique, Anti colony optimization. In this paper section second covers the review on work of different researchers and scholars in the field RDH. Section third and forth gives the conclusion and future work and section five presents the references had been considered for the work.

II. LITERATURE REVIEW

A number of researchers and scholars proposed different data hiding technique. Reference [1] proposed a reversible data hiding method for natural images. In this paper for hiding an image multilevel histogram modification is used. This is far better as compare to one or two level histogram modification technique here secret data is embedded in differences of adjacent pixels values and gives a better quality results. In reference [2] an image is slightly modified the gray scale value to embed information in to the image by using histogram modification which select the zero point and the maximum point to modify the image. The algorithm used here is reversible data hiding based on histogram modification. Reference [3] proposes to use the quad-tree segmentation for increasing the hiding capacity of the reversible image data hiding scheme that embeds secret data through shifting the histogram of image pixels. In this paper a hierarchical segmentation is done on the input host image and converts it into several variable-sized blocks of pixels. These partitioned blocks are organized as a tree structure for the ease of representation. The secret message and the partition tree information are then embedded in these image blocks. With the proposed segmentation scheme, the algorithm can easily find a suitable non-overlapped partition of the image to significantly increase embedding capacity.

Reference [4] shows that the quality of an image after extracting from the hiding data is one of the important aspect which is usually assessed using image quality metrics. In this paper, a new FR metric, Image Enhancement Metric (IEM) is proposed which has been observed that the only metric that can be used for general and medical images for assessing improvement in contrast and sharpness is IEM. Standard Deviation also increases with increase in contrast and sharpness. So IEM together with SD may be considered useful for assessing quality of the enhanced image with respect to contrast and sharpness variations. Reference [5] describes a novel and fully reversible data embedding algorithm for digital images is proposed. And the proposed algorithms are used to enhance their payload capacity. In this paper contrast stretching is used to produce space for hide the information without affecting the quality of image. For extremely important images, such as those used in medical, legal or military environment, the technique is very useful. Reference [6] presents a review on the different image contrast enhancement techniques. Image enhancement is a processing on an image in order to make it more appropriate for certain applications. Image Enhancement techniques increase the contrast of image which is result produce better picture. There are many image contrast enhancement techniques like Linear Starching, Histogram Equalization, Adaptive Histogram Equalization, Convolution Mask Enhancement and Enhancement by Point Processing. This paper focuses on the comparative study of contrast enhancement techniques with special reference to local and global enhancement techniques.

In reference [7] a Novel method is proposed by reserving room before encryption with a traditional RDH algorithm. It maintains the excellent property that the original image can be lossless recovered after embedded data is extracted while protecting the image content's privacy. An algorithm on Reversible Data Hiding on images and data, not only enhances the data transmission but also data security. In reference [8] proposed scheme introduces a lossless recovery with visible digital watermarking technology. In this paper the hiding and recovering the information without loss is achieved by histogram shifting and also resolving the destruction of original images in visible digital watermark, and solving small amount of information hidden problems. Reference [9], this paper presents is a review on RDH reversible data hiding technique. This paper shows that there are difference methods like expansion, interpolation technique, prediction and sorting, histogram modification for data hiding which is now used in encrypted images to improve security. Different RDH algorithms have their own merits and no single approach is optimal and applicable to all cases. This paper is a comprehensive exploration of all the major reversible data hiding approaches and also presents a new method RDH by reserving room before encryption.

Reference [10], proposed a new reversible data hiding method with the functionality of contrast enhancement has been developed for medical images. In this paper automatic background segmentation is conducted so as to differentiate the region-of-interest (ROI) from background and the contrast of ROI can be selectively enhanced to improve the visual distortion so that better visual quality and more contrast enhancement effects can be achieved. Reference [11], proposed a new method for improving both data hiding rate as well as data embedding capacity by extending the work to color images. In this method data are embedded into the three different layers of color images i.e. red, green and blue. For extracting the hidden data from the image, peak values of the highest two bins in the histogram into which the data is embedded are stored in the last 16 excluded bits in the image. Data hiding can be extended to video as future work. Also improving the PSNR value of the extracted image can also be considered in the future works. Reference [12], presents a review on existing technique it has been shown that the existing algorithms has neglected the following issues like medical and satellite images for the better visibility. Moreover the value of L is taken statistically which has limited the scope of the reversible data hiding algorithm. Therefore to overcome these issues, a new reversible data hiding algorithm by using the ant colony optimization technique can be proposed to overcome these issues.

Reference [13] presents a review on current Image Steganography trends with focus on Spatial Domain Techniques. This paper focused on spatial domain techniques since they are offering a higher payload while satisfiably meeting the other requirements. It also compares various techniques to ensure which is the best one to implement and also discussed some advantages as well as disadvantages comparing various methods. Reference [14] presents a review on data hiding scheme for encrypted image using space pre allocation. This paper presents a survey of previously used techniques considering all the facts, merits and also the demerits. Data hacking is a very big problem in the network field; RDH maintains the excellent property that the original cover can be recovered lossless after embedded data is extracted. It provides image content's confidentiality, security and authentication. Reference [15] mainly focused on digital gray scale images. The proposed algorithm used here is RDH for data hiding. The two main accepts of this paper is the image quality and security and also the decreased bandwidth which can be obtain by performing histogram equalization. The data is embedded in the image, compressed and encrypted using chaotic encryption such that the data and image are completely recoverable.

Reference [16] this paper proposes the DHE method where we would preserve the data in an image with a high secure value and which is free from other side effects. For storing the data a color image is used rather than a gray scale image because the factor of storing huge amount of data while considering the bit value of grey scale with RGB image to achieve the enhance and highly secure data. Reference [17] proposed Exemplar based in painting algorithm which is efficient reconstructing the large target regions. Image in painting can generate or create image regions that initially do not exist at all, based on the useful information in the close neighborhood. The visual distortion and error diffusion caused by the progressive compression is controlled by the Vector quantization. After segmenting the image compressed codes into a series of sections by the indicator bits, the receiver can achieve the extraction of secret bits and image decompression successfully according to the index values in the segmented sections. Reference [18] presents reversible data hiding (RDH) algorithm is proposed for digital images. To improve the visual quality of the host image, an algorithm is proposed to enhance the contrast of the host image. XOR encryption and decryption algorithms are also used to improve security of the hidden data.

In reference [19] a new reversible data hiding algorithm has been proposed with the property of contrast enhancement.. The proposed method can take advantage of all traditional RDH techniques for plain images and achieve excellent performance without loss of perfect secrecy. For better visibility improving the algorithm and applying it to the medical and satellite images becomes the part of the system. Reference [20] is a survey paper on Reversible Image Data Hiding. The proposed algorithm has made the image contrast enhancement reversible

III. CONCLUSION

In this paper shows the review on existing techniques here the main aim is to propose a new robust reversible data hiding algorithm to overcome these issues concept is to hide the data to provide the security for that the original image can be exactly recovered without any additional information.

IV. FUTURE WORK

This technology finds many applications in the advance machinery so better performance is expected in the future with the development and research in this field. A number of developments can be performing on this technology in the following fields:

1. In medical and satellite images for the better visibility.

2. In the area were security becomes the concern area.

REFERENCES

[1] Zhenfei Zhaoa,b, Hao Luoc,, Zhe-Ming Luc, Jeng-Shyang Pand, "Reversible data hiding based on multilevel histogram modification and sequential recovery", International Journal of Electronics and Communications (AEÜ),vol.65 pp.814-826, January 2011.

[2] Der-Chyuan Lou,chen- Hu and Chung-chung Chiu "Steganalysis of Histogram Modification Reversible data Hiding Scheme by Histogram feature coding ", International journal of Innovative Computing Information and Control, Vol.7 No. 11,pp-6571-6583,November 2011.

[3] Yih-Chuan Lin and A Tzung-Shian Li, "Reversible Image Data Hiding Using Quad-tree Segmentation and Histogram shifting", Journal Of Multimedia, Vol. 6, No. 4,pp.349-358 August 2011.

[4] Jaya V. L and Munaga R. Gopikakumari, "IEM: A New Image Enhancement Metric for Contrast and Sharpness Measurements", International Journal of Computer Applications, Vol.79 No.9, pp.233-243. October 2013.

[5] A. S. Al-Fahoum and M. Yaser, "Reversible Data Hiding Using Contrast Enhancement Approach", International Journal of Image Processing (IJIP), Vol.7Issue 3 ,pp.348-356 October 2013.

[6] Dr. Vijay Dhir and Sanjeev Kumar, "Review of Various Image Contrast Enhancement Techniques", International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 4 Issue 8 pp.110-113 August 2014.

[7] Ashwind S , Ganesh K , Gokul R and Ranjeeth Kumar C, "Secure Data Transmission Using Reversible Data Hiding", International Journal of Computer Science and Information Technologies, Vol. 5 Issue 2 pp. 861-1863 , 2014.

[8] Nutan Palshikar and Prof. Sanjay Jadhav, "Lossless Data Hiding using Histogram Modification and Hash Encryption Scheme", International Journal of Emerging Technology and Advanced Engineering, Volume 4, Issue 1pp.485-493 January 2014.

[9] Sruthi and Manoj Ray D, "A Review: Reversible Data Hiding Techniques", IOSR Journal of Computer Engineering, pp.16-21, 2014

[10] Hao-Tian Wu, Jiwu Huang and Yun-Qing Shi , "A reversible data hiding method with contrast enhancement for medical images", Joyrnal of visual communication and image representation pp. 146–153 June 2015.

[11] Rose Mary kurian and Divya S. B., "An Improvement in Data Hiding Rate on Color Images", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 4, Issue 8, pp.289-292 August 2015.

[12] Jaspreet Kaur and Er.Varinderjit Kaur, "A Review on reversible Data hiding Technique", International Journal of Computer Science and Mobile Computing Vol. 4, Issue. 7, pp.334–340, July 2015.

[13] Saleema.A and Dr.T.Amarunnishad, "A Review on current Image Steganography trends with focus on Spatial Domain Techniques", International Journal of Engineering Trends and Technology (IJETT), Vol.29 No.1, pp.51-57, November 2015

[14] Janhavi Dongare and Prof. Vaibhav Deshpande, "Review on Data Hiding Scheme For Encrypted Image Using Space Pre-Allocation", International Journal For Engineering Application and Technology.

[15] Anju Mariyam Zacharia, Shyjila P.A and Karthika J. S., "Compressed and High Secured Image Data Hiding With Contrast Enhancement", International Journal of Informative & Futuristic Research (IJIFR) Vol. 2, Issue – 8 pg.749-2760 April 2015.

[16] D. Bharadwaja and Y. V. N. Tulasi, "Enhance Image using Dynamic Histogram and Data Hiding Technique", International Journal on Advanced Computer Theory and Engineering (IJACTE), Volume -4, Issue -1, 2015.

[17] A. S. Shankari and Dr. J. Shanthini, "Enhance Novel Joint Data-Hiding and Compression Scheme Based on exemplar approach", International Research Journal of Engineering and Technology (IRJET), Vol.02 Issue. 08, pg.136-139 Nov-2015.

[18] Farsana N. U. and Selin M., "Secure Reversible Image Data Hiding with Contrast Enhancement", International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 6, Issue 1pg.88-91, January 2016

[19] Ashwini R. Gaykar and Prof. S. M. Rokade, "Data Hiding with contrast enhancement by

using RDH Algorithm", International Journal of Engineering Development and Research, Vol.4, Issue-1, pp.145-149, May-June 2016.

[20] Rasika P. Kulkarni and Archana S. Vaidya, "A Survey Paper on Reversible Image Data Hiding", International Journal of Scientific Engineering and Technology, Vol.5 Issue 1 pg.32-36 January 2016.