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Energy Selection of DCT Blocks approach For Medical Image Watermarking

Amit Kumar Singh
CSE department
Integral University, Lucknow

Manish Madhava Tripathi
CSE department
Integral University, Lucknow

Abstract:- **In reversible watermarking algorithm for medical images, the original image will be extracted back. So that it is broadly used in the medical image protection. It is proposed in this paper is new reversible watermark medical image scheme based on integer discrete cosine transform and difference expansion. The integer discrete cosine transformation is not only stay away from truncation error dissertation and but it is also lead to a faster processing speed hardware is easily handle implement. This scheme is firstly divided new image in to some non overlapping blocks after then used blocks in difference expansion embedding and extracting algorithm. This energy is less than some predefined thresholds .If it is medical image is order to satisfy the reversible underflow and overflow of data is considered and prevented. It is to end with experimental results point up that the proposed algorithm has been possible applications in medical image processing.**

Keywords:- Medical image, reversible watermark, integer discrete cosine transform, energy threshold section.

1.INTRODUCTION:

Digital watermarking of medical images scheme has been comprehensively studied in the past decades. It is most important watermarking medical images technology today. It is necessary for the human life. Because it is patient information secures confidential and it is integrity and maintain in the medical images. When transmitted from one hospital to another hospital and online transfer.Reversible watermarking image has been more attractive and interest in both medical research and application. it is an original image completely restore of the watermarking after it has been extracted.This characteristicis image demanded in the high quality demanded especially in medical, legal and military field. It is not acceptable caused by embedding and extracting for any permanent distortion in these fields.Some of these reversible watermarking medical images schemes are fragile and becomes irreversible watermark when encountering attacks for these methods. Some scheme has recover watermark correct after these are watermark image is attacked.Mostly watermarking medical image scheme is based on frequency domain embedding scheme .these watermark policy more robust against some attack in comparison to JPEG compression.
It is achieve to recessively watermarking medical image is used to embedding the sequence into frequency domain coefficients and some schemes map record to embedding status of the coefficients.But map of location has to embedded simultaneously with the watermark. The embedding capacity has reduce and an image processing operations is also makes the watermark more vulnerable. Mostly proposed of reversible watermarking method a spatial domain watermarking scheme based on embedding schemes such as histogram modification and difference expansion.

The watermarking medical image to improve the capacity and reduce the embedding induced distortion, most schemes watermarking medical image divide in to two parts exploit on ROI(region of interest) and RONI(region of non interest) of medical image. It is watermarking images and medical images have constructive for ROI and RONI areas, it is offer benefits for watermark medical algorithm.
This paper based on integer discrete cosine transform and difference expansion of reversible watermarking medical image.

2. RELATED WORK:

2.1. Discrete cosine transform (DCT):

The discrete cosine transform has been extensively used in algorithmdesign digital watermark. As the discrete cosine transformation of the real number, these output for the discrete cosine transform is real number,thease have been causes some extra rounding off in image processing.
There is integer discrete cosine transform fill the transformation matrix for uses integer for regular floating point numbers. If it has not floating point numbers and got a high accuracy. It is core transformation is completed to simple addition, shift operations, and it may be reduce the computing complexity. These are characteristics used in some transformation for the solve the matching problem between encoders and decoders, integerasthmatic avoid s accuracy error, forward transform and inverse transform, ensure the reversibility of coding.

2.2. DifferenceExpansion (DE).

There is difference expansion scheme is as follows for an 8-bit gray scale image, a pixel pair (p,q) is used to embed a secret bit E,E∈{0,1}. In the embedding phase , the difference value H and the integer value L are defined as:

$$H=p-q, L=\left\lfloor \frac{p+q}{2} \right\rfloor \quad (1)$$

The inverse transform is

$P=L+\left\lfloor\frac{H+1}{2}\right\rfloor$, $q= L-\left\lfloor\frac{H}{2}\right\rfloor$ (2)

Next the new difference H' is obtained as follows:
$H'=2\times H+S$ (3)
Finally, the stego-pixel (p',q') is obtained by the following transform :

$P'=L+\left\lfloor\frac{H'+1}{2}\right\rfloor$, $p'= L - \left\lfloor\frac{H'}{2}\right\rfloor$ (4)
In these order to prevent underflow and overflow of data, new difference H' for the absolute value after a secret bit E has been embedded , must satisfies the following condition:
$|\boldsymbol{H'}|\leq\min(2\times(255-L), 2\times L+1$ (5)

3. PROPOSED METHOD:

There paper is a novel for reversible watermarking medical images based on energy selection of blocks is proposed.Firstly it is assume the size of image 8×8 block, and then it is apply 2-DCT to each block. If the intensity values of the 8×8 blocks are $\boldsymbol{M_{ij}}$, then the corresponding DCT coefficient $\boldsymbol{N_{ij}}$ are given by:

$\boldsymbol{N_{ij}}$=DCT2($\boldsymbol{M_{ij}}$) (6)
Where DCT2 denotes a two dimension discrete cosine transform and i, j={0, 1, 2,……..,7}

Energy of block is computing using:
$G = \sum_{i=1}^{7}\sum_{i=1}^{7}\|\boldsymbol{N_{ij}}\|^2, \forall\, \boldsymbol{i,j} =\{0,\ 1,\ 2,\ldots\ldots..,7\},\{I,j\} \neq \boldsymbol{0}$ (7)

It is not calculation energy or embedding for the DC coefficient ((I , j)=0) . If the quality of image heavily since any variation in the DC coefficient of a block degrades.

The Mean value of energy is calculated using:
$MVE= \frac{1}{D}\sum_{d=1}^{n}\boldsymbol{Gd}$ (8)

Where D=total number of the blocks and d=block number.
Identify the valid block (VDs) which satisfy the energy threshold criteria G≥Gt, where Gt=y×MVE, and y is the threshold value defined from the user.

Secondly the watermark image converted into one dimensional using zigzag scan and needed to be zigzag image scanning could be perform after the encryption of the watermarking medical image. Because it is watermark image is binary image and the outputzigzag scan image in to binary sequence. The region of zigzag scan image is that zigzag scan image will make the adjacent pixels spread. It will be provide more robustness then that the other scanning method like raster scan.

It is must to be prevented data underflow and over flow of the ending. If it is the close boundary may be easily underflow and overflow later than watermark embedding. For example, in a 8 bit gray scale image ,the pixel value range of[0,255], if these pixel are less than zero, any pixel has beyond 255 is overflow and underflow it.
This watermarking medical image is to prevent this phenomenon of the embedding phase and a reconstructing simulation method is induced.
After is embedding of the each block does not meet to demanded of this algorithm, it will be regard that intact and to be each procedure shall be performed on the next suitable block.
It is the point algorithm is given in the following.

(1) The medical image can be divided the cover image 4×4 non-overlapping blocks.
(2) In medical image each block apply to apply integer DCT.
(3) In the medical image can be calculated each block and select block proper with the definite threshold value and generate the index of proper blocks.
(4) Medical image embeddingthe secret bits into selected blocks. The medical image reconstructing simulation is to be performing with the embedding. In those blocks of the medical image simulation test and it will be recordedin indexed embedded blocks, namely to be finally index of embedding.
(5) Each block in medical image is to apply inverse integer DCT. The final indexed is combined into encryption key of watermark and encryption user selected encryption process, to form the key of respective to the stigo-image.

1	5	9	13
2	6	10	14
3	7	11	15
4	8	12	16

Figure 1. The index of 4×4 matrix of coefficients

This image is to reduce the embedding stimulated distortion and used for embedding to the middle frequency coefficients. If the embedding is secret bit in the low frequency coefficient. It will simulate more distortion. Embedding image the secret bits in the low frequency coefficient will make less distortion, but it induce then the low frequency coefficients for vulnerable image processing operations.So it is the image of the middle frequency coefficients are used to embed the secret bits. Because that the difference expansion embedded needs 2 carry 1 bit. It is choosingembedding for the coefficient number 12 to 13 as shown in figure 1.

4. EXPERIMENTAL RESULTS:

There is to be measure the visual quality and d the embedding tempt distortion of the medical imagePSNR (peak signal-to noise ratio) is to tempt to the metrics of the

proposed system the signal of the medical image to be cover image by embedding of the watermark. Medical image computed as following of the PSNR.

$$\text{PSNR} = \mathbf{10}\boldsymbol{log}_{\mathbf{10}}\left|\frac{\boldsymbol{MAX^2}}{\boldsymbol{MSE}}\right| \quad (9)$$

$$\text{MSE}=\frac{\mathbf{1}}{\boldsymbol{K}\times\boldsymbol{U}}\sum_{\boldsymbol{p}=\mathbf{1}}^{\boldsymbol{K}}\sum_{\boldsymbol{q}=\mathbf{1}}^{\boldsymbol{U}}(\mathbf{R}(\mathbf{p},\mathbf{q})-\mathbf{R'}(\mathbf{p},\mathbf{q}))\mathbf{2} \quad (10)$$

MAX denotes the max pixel value of the image, K and Udenote the width and height of the image,R (p, q) and R' (p, q) denotes the pixel values of the position (p, q) in the cover image and stego-image, respectively.

4.1. Capacity of embedding:

The embedding capacity has been decide algorithm by number of blocks for the respective energy. It is also existence of underflow or over flow and the rounding of the error. Variousblocks are not use embedding for reconstruction simulation show they are not fit for embedding.

These images are different that it has different image have different pattern region of interest (ROI) and region of non interest (RONI).Medical images having then smaller scale of RONI.It will have a higher count of energy blocks.

4.2. Analysis of experimental results:

Medical image is the energy threshold of the block selecting proposal combined with the JPEG quantization matrix to enhance the robustness of the watermark, the energy threshold founded block selecting methodis used in the at handed algorithm to select the proper blocks in region of interest (ROI). The experiment result in [2] suggest that the threshold value would be minimize the perceptional alteration tempt by the embedding.The proposed algorithm is fragile measure up to with the algorithm projected in [2] and of less capacity. It is the proposed algorithm highly needed to watermark medical image.

5. CONCLUSION:

We proposed an efficient reversible watermarking algorithm for medical images. The proposed algorithm has good security and cannot be easily attacked. Because of the redundancy of intDCT, and reconstructed image has good quality of medical image for the proposed algorithm and enhancing the security.These papers are reversible watermarking medical image proposal base on integer discrete cosine transform and difference expression to draw the benefit of the constructive region of interest and region of non interest. The embedding method is introduced for the energy-threshold based block selection process. It is caused by the embedding and rounding error for the under flow/overflow consider from the proposed algorithm. The experimental result meets to need of medical image watermarking.

REFERENCES :

1. Manish MadhavaTripathi, S P Tripathi, "Strict Attestation Of Medical Image Watermarking", International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 4, April – 2013.
2. Manish MadhavaTripathi, S P tripathi, "A Review of Medical Image Watermarking Schemes", International Journal of Engineering Research & Technology (IJERT),Vol. 1 Issue 10, December- 2012.
3. Manish MadhavaTripathi, S P tripathi, "Improved Watermarking and Recovery using Modulo DCT", TMU conference, TMU, Moradabad, 2014.
4. Du y., and Zhang T.,"A reversible and fragile watermarking algorithm based on DCT," 2009 International conference on Artificial Intelligence,2, pp.301-304.IEEE,2009
5. Manish MadhavaTripathi, S P Tripathi, "A Block based Reversible Medical Image Watermarking",International Journal of Computer Science and Information Technologies, Vol.4(2) 2013,306-311.
6. Abhishek Ranjan Pandey, Manish MadhavaTripathi, "Medical Image watermarking for Mobile Smart phones", International Journal for Innovations in Engineering, Science and Management, *Volume 2, Issue 11, November 2014.*
7. Mahesh Prasad Tiwari, Manish MadhavaTripathi, "Performance Analysis of Digital Watermarking Methods for Medical Images based on PSNR and MSE", International Journal for Innovations in Engineering, Science and Management, *Volume 2, Issue 12,December 2014.*
8. Mohammad Haroon, Mohammad Husain," Different Types of Systems Model For Dynamic Load Balancing", IJERT, Volume 2, Issue 3, 2013.
9. Mohammad Haroon, Mohammad Husain," Different Scheduling Strategy For Dynamic Load Balancing in Distributed System", 3rd international conference TMU Moradabad.
10. Mohammad Haroon, Mohammad Husain,"Analysis of a Dynamic Load Balancing in Multiprocessor System", International Journal of Computer Science engineering and Information Technology Research, Volume 3,march 2013.