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MULTIPLE DIFFERENCE HISTOGRAM MODIFICATION FOR A NOVEL REVERSIBLE DATA HIDING SCHEME

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***Abstract*—Prediction error expansion is the most successful reversible data hiding techniques and existing PEE based RDH methods are mainly based on the modification of one or two dimensional prediction error histogram. We propose a new RDH method based on PEE for multiple histograms. A sequence histograms and devise a new embedding mechanism based on multiple histograms modification.Two expansion bins are selected in each generated histogram and data embedding is realized based on MHM. The expansion bins are adaptively selected considering the image content such that embedding distortion is minimized. Such selected expansion bins the proposed MHM based RDH method works well.**

I.INTRODUCTION

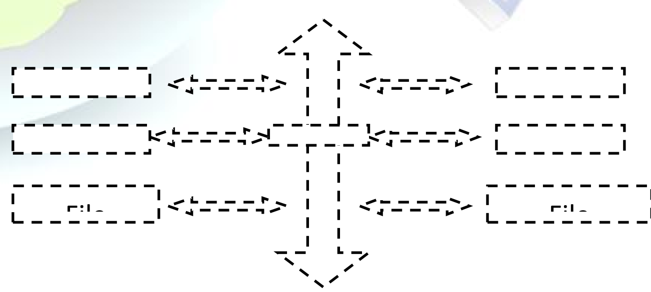
Image processing is analysis and manipulation of digitized image.In order to improve its quality.To convert on image into digital form and perform some operations.To extract some useful information. Data recorded by sensors on a satellite restrain errors related to geometry and brightness values of the pixels. These errors are corrected using appropriate mathematical models which are either definite or statistical models.

II.HISTOGRAM MODIFICATION FOUNDAMENTALS

A novel reversible data hiding algorithm, which can recover the original image without any distortion from the marked image after the hidden data have been extracted, is presented in this paper. This algorithm utilizes the zero or the minimum points of the histogram of an image and slightly modifies the pixel grayscale values to embed data into the image. It can embed more data than many of the existing reversible data hiding algorithms. It is proved analytically and shown experimentally that the peak signal-to-noise ratio (PSNR) of the marked image generated by this method versus the original image is guaranteed to be above 48 dB. This lower bound of PSNR is much higher than that of all reversible data hiding techniques reported in the literature. The computational complexity of our proposed technique is low and the execution time is short. The algorithm has been successfully applied to a wide range of images.

III.HISTOGRAM MODIFICATION SCHEME

ARCHITECTURE DESIGN



This is the architecture design representation of parts or functions are represented by blocks connected by lines that show the relationships of the blocks.

They are heavily used in the engineering world in hardware design, electronic design, software design, and process flow diagrams. This is typically used for a higher level, less detailed description aimed more at understanding the overall concepts and less at understanding the details of implementation.

The system architecture or the design gives value of revealing the process that is done during the experimental works. The sender first authenticates himself to enter the system which is known as the login details that is stored in the database and the takes the image that he wants to transmit and collects the data that are important as a cover message and then encrypts the image. [4] proposed a system, this system has concentrated on finding a fast and interactive segmentation method for liver and tumor segmentation. In the pre-processing stage, Mean shift filter is applied to CT image process and statistical thresholding method is applied for reducing processing area with improving detections rate. In the Second stage, the liver region has been segmented using the algorithm of the proposed method. Next, the tumor region has been segmented using Geodesic Graph cut method. Results show that the proposed method is less prone to shortcutting than typical graph cut methods while being less sensitive to seed placement and better at edge localization than geodesic methods. This leads to increased segmentation accuracy and reduced effort on the part of the user. Finally Segmented Liver and Tumor Regions were shown from the abdominal Computed Tomographic image.

IV.HISTOGRAM TECHNIQUES

A,C-PEE

The bins −1 and 0 are expanded to embed data, while other bins are shifted to create vacancies to ensure the reversibility. Then, the cover pixel xi is modified to $_xi = _xi + _ei$to generate the marked pixel. Notice that the above procedure will stop once all data bits are embedded, i.e., only the cover pixels $(x1, . . . ,xN$end$)$ need to be processed where Nend$\leq N$ isthe smallest index such that the payload can be embedded into the first Nend cover pixels.

B. A-PEE

As an extension to C-PEE, the adaptive embedding
strategy has been proposed to better exploit the image
redundancy [40]–[43]. Specifically, for A-PEE, a complexitymeasurement denoted by $ni$is computed for each xi accordingto its context. Then, only the pixels satisfying $ni<T$ willbe embedded, where T >0 is a pre-selected threshold.This means, for each xi with $ni<T$, it will be processedaccording to the C-PEE embedding procedure. Otherwise,i.e., $ni\geq T$, xi is ignored and its value keeps unchanged.Here, the threshold T is an important factor for the embedding
performance of A-PEE. To better utilize smooth pixels, T istaken as the smallest positive integer such that the payloadcan be successfully embedded.

C.O-PEE

select the bins −1 and 1for expansion. In this situation, only the bins larger than 1or smaller than −1 need to be shifted, while the bin 0 mayremain unchanged. As a result, compared with C-PEE, the
expected value of embedding distortion is reduced from $N-H$to$N-2H$.Through this example, we see that it is possible to improveC-PEE by suitably selecting expansion bins. For a given EC,one can select two expansion bins $a<b$ to minimize the
embedding distortion, and the optimal expansion bins can bedetermined by repeated embedding for a collection of (a, b).

D. AO-PEE

If the aforementioned two improvements for C-PEE,
adaptive embedding and optimal expansion bins selection,are combined together, better performance can beexpected [55], [56]. This combined embedding is calledAO-PEE in our work. We now briefly
describe the AO-PEEembedding procedure as follows. First, for a cover pixel xi ,if its complexity measurement $ni<T$, the prediction-error$e$is modified according to (6) to get $\_ei$. Then, xi is modified

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to $\_xi = \_xi + \_ei$ to get the marked pixel. Here, the sameas A-PEE, the pixels with $ni \geq T$ are ignored and unmodified.

E. Reversible Data Embedding Using a Difference Expansion algorithm

TheReversible data embedding has drawn lots of interest . Being reversible, the original digital content can be completely restored. A novel reversible data embedding method for digital images. We explore the redundancy in digital images to achieve very high embedding capacity, and keep the distortion low.

*F.*Reversible Data Hiding Based on Histogram Modification algorithm

A reversible data hiding scheme based on histogram modification.The binary tree structure to solve the problem of communicating pairs of peak points. Distribution of pixel differences is used to achieve large hiding capacity while keeping the distortion low. We also adopt a histogram shifting technique to prevent overflow and underflow. Performance comparisons with other existing schemes are provided to demonstrate the superiority of the proposed scheme.It can embed more data than many of the existing reversible data hiding algorithms. It is proved analytically and shown experimentally that the peak signal-to-noise ratio (PSNR) of the marked image generated by this method versus the original image is guaranteed to be above 48 dB. This lower bound of PSNR is much higher than that of all reversible data hiding techniques reported in the literature. The computational complexity of our proposed technique is low and the execution time is short. The algorithm has been successfully applied to a wide range of images.

*G.*Low Distortion Transform for Reversible Watermarking algorithm

The low-distortion transform for prediction- error expansion reversible watermarking. The transform is derived by taking a simple linear predictor and by embedding the expanded prediction error not only into the current pixel but also into its prediction context. The embedding ensures the minimization of the square error introduced by the watermarking. The proposed transform introduces less distortion than the classical prediction-error expansion for complex predictors such as the median edge detector or the gradient-adjusted predictor. Reversible watermarking algorithms based on the proposed transform are analyzed.

*H.*Smoothing And Optimal Compression of Encrypted Gray Scale Images algorithm

Government, military and private business amass great deal of confidential images about their patient (in Hospitals) ,geographical areas (in research),enemy positions (in defense) product, financial-status. Most of this information is now collected and stored on electronic computers and transmitted across network to other computer, if these confidential images about enemy positions ,patient ,and geographical areas fall into the wrong hands, than such a breach of security could lead to lost of war , wrong treatment etc. Protecting confidential images is an ethical and legal requirement. We store information in computer system in the form of files. File is considered as a basic entity for keeping the information. Therefore the problem of securing image data or information on computer system can be defined as the problem of securing file data.

V CONCLUSION

An efficient RDH method is proposed based on PEE of multiple histograms. For each pixel, its prediction value and complexity measurement are first computed according to its context, then multiple histograms are generated by counting the prediction-errors for different complexity levels. Finally, data embedding is implemented according to the proposed embedding strategy based on multiple histograms modification. Moreover, to optimize the embedding performance, the expansion bins are adaptively selected in each generated histogram such that the distortion is minimized. Experimental results have shown that the proposed method outperforms the previous PEE-based techniques and some state-of-the-art methods by improving the marked image quality.

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