ABSTRACT
Image compression is one of major challenge for multimedia encoding and decoding process in real time world environment. We describes an echocardiogram coding method that takes into account the visualization modes in order to compress efficiently the echocardiogram, a methodology to evaluate compressed echocardiograms, and the evaluation of the compression method using the proposed evaluation methodology. The compression method takes advantage of the particular characteristics of each visualization mode and different compression techniques for each mode to compress efficiently the echocardiogram. A complete evaluation has been designed in order to recommend a minimum transmission rate for each operation mode that guarantees sufficient clinical quality. The evaluation of the echocardiograms compressed with the proposed method has been carried out. We perform MSPHIT approaches for compression process in echocardiogram images in real time applications.

Keywords – Compression, MSPHIT, PSNR, MSE

I. INTRODUCTION
Medical images include computed tomography (CT), and magnetic resonance (MR), ultrasound images and capsule endoscopy images which require huge amounts of memory. Due to the limitations of storage and transmission bandwidth of the medical images, the main problem of the technology lies in how to compress a huge amount of visual data into a low bit rate stream, because the amount of medical image data would overwhelm the storage device without an efficient compression scheme.

Compressions are generally of two types: Lossy and Lossless compression. Lossy compression provides greater compression rate, but the medical image quality decreases. On the other hand the lossless compression provides medical images of good quality but its compression rate is relatively low compared to the Lossy compression. In medical image we want to compress the medical image at larger compression rate and also we want to preserve the quality of the medical image. So in the proposed method we will make use of both the Lossy and Lossless compression techniques.

One of the well-known compression techniques is the fractal image coding. Here using the self-similarity concept the medical image is represented as contractive transformation coefficient. This method provides medical images of good quality. Fractal encoding can be increased by many methods like the use of domain pools and the search type followed in block matching, etc., another method used for increasing the encoding speed is by using some hybrid coders.

The inter relationship between the fractal and transform based coders are revealed by analyzing the hybrid coders. The problem with the fractal image coding is the expensive fractal encoding time. In order to solve this problem the hybrid coder called PWHPS (Packet Wavelet Hybrid Partitioned Set) is used. Here the medical image is decomposed into approximation and detailed components using the PWT(Packet Wavelet Transform). Then the approximation component is compressed using the Lossy technique called QPIFS (Quadtree Partitioned Iterated Function System) and the detailed component using the Lossless technique called SPIHT(Set Partitioning in Hierarchical Tree). By using these methods the image details and the wavelet progressive transmission characteristics are maintained, the blocking effects from fractal techniques are not created. However, the compressed image should be a high quality image compared to the original image.

The proposed method produce images of high quality compared to the images compressed using JPEG compression [3]. The amount of digital visual data (image, video and 3D object) has increased rapidly on the Internet. Image, video and 3D object security becomes increasingly important for many applications, e.g., confidential transmission, video surveillance, military and medical applications. For example, the necessity of fast and secure diagnosis is vital in the medical world. Nowadays, the transmission of visual data is a daily routine and it is necessary to find an efficient way to transmit them over networks. Two main groups of technologies have been developed for this purpose. The first one is based on content protection through encryption. In this group, proper decryption of data requires a key.
The second group bases the protection on digital watermarking or data hiding, aimed at secretly embedding a message into the data. In order to not increase the processing time, these two approaches must be combined with the compression stage. Nowadays, the challenge is to perform simultaneously for example image encryption and compression. Generally the visual cryptography method has a few problems. For instance when the pixels are expanded, the level of security applied is high but the reconstructed image quality is low. Similarly if the extent of pixel expansion be reduced, its security is lowered however quality of the image is retained. So to achieve high security as well as to get good image quality this paper has framed new efficient splitshare and joinshare algorithms for gray scale image.

The main advantage of this proposed method is to provide good quality of the image with security and without any post or pre processing [1]. However, the schemes of Horng et al. and Prisco and Santis are designed for binary images. To extend the application into grayscale images, in 2007, Zhao et al. proposed a verifiable secret sharing scheme based on an improved version of Thien and in’s method. Zhao et al.’s scheme allows honest participants to identify cheaters by using extra information. To do so, the dealer must publish two parameters and the participants must publish their secret share references during the shares construction phase. That is to say, both the dealer and the participants must communicate among themselves to make sure each secret share reference, which is derived by a secret share, is unique. Moreover, their scheme is limited to grayscale images and cannot be directly applied to color images. Zhongmin Wang, . Halftone visual cryptography (HVC) enlarges the area of visual cryptography by the addition of digital halftoning techniques. In particular, in visual secret sharing schemes, a secret image can be encoded into halftone shares taking meaningful visual information. In this paper, HVC construction methods based on error diffusion are proposed.

The secret image is concurrently embedded into binary valued shares while these shares are half toned by error diffusion—the workhorse standard of half toning algorithms. Error diffusion has low complexity and provides halftone shares with good image quality. In this paper, we discuss the secure of transferring of medical images. We propose two cryptosystems, the first one is a very fast algorithm by block, the TEA (Tiny Encryption Algorithm) and the second is a stream cipher based on Vigenere’s ciphering. We show differences existing between them, especially concerning the combination of the image encryption and the compression. Results applied to medical images are given to illustrate the two methods.

In the base paper, a methodology for estimating the photon density in digital photographs. This allowed us to use a variance-stabilization operator to transform the Poisson noise associated with photographs into a Gaussian additive noise with fixed variance = 1, here PSNR=28.5dBIn the base paper bilateral filter and Gaussian noise are used. Bilateral performs poorly far from its optimal parameter. It is tedious, error to prone hard to automate. Gaussian noise is not a good model for most terrestrial links because of multipath, terrain blocking, interference.

II. PROPOSED WORK

Image processing is any form of signal processing for which the input is an image, such as photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Denoising is the extraction of a signal from a mixture of signal and noise. The denoising process is done by steps like compressing, encoding, decoding and decompressing the image by using DWT and MSPIHT algorithm, and thus we get the efficient image. In the proposed system we use DWT and MSPIHT algorithms for image compression, encoding and decoding to increase the PSNR value. First read the image After read the image, the Discrete wavelet transform is applied and image decomposition is performed. The decomposition of images is encoded in bit by bit level. Here MSPIHT algorithm is used for encoding the decomposition images co-efficient to vector representation. After that we use decoding technique, the reciprocal of encoding function using MSPHIT algorithm. In that decoding noise is removed and we get the efficient clear image and also we get high PSNR value.

In this project, we propose to use Poisson distribution characteristics to estimate the PSNR value from relative illumination data, under simple hypotheses. This allows us to use variance-stabilizing methods on standard digital photographs. The noise becomes close to additive Gaussian from its optimal parameter. It is tedious, error prone hard to automate. Gaussian noise is not a good model for most terrestrial links because of multipath, terrain blocking, interference.

Read the Image

Read the image which we proceed the analysis in our project work. After reach the image, initially we find size of image and M X N sub image of pixels calculations with the respect the maximum size of the image. Define an intensity image in the MATLAB workspace. To read in an intensity image from a file and convert it to double-precision, at the MATLAB command prompt, This uses the local function teach
image to read an image from disc, and convert it correctly to a gray-level array with values in the range 0-1. We then use the Matlab function imshow to display it in a figure window.

**Discrete Wavelet Threshold Transform**

After read the image, the Discrete wavelet transform is applied with respect to the threshold techniques. Here Image decomposition is performed .Here we performed 4 x 4 or 2 x 2 decomposition levels with respect to LP and HP filters.

\[ \psi_{\omega,n}(t) = \frac{1}{\sqrt{2^\omega}} \psi(t - 2^\omega n/2^\omega), \omega, n \in \mathbb{Z} \]

**Wavelet transform basics**

Normally, signals are represented in time-domain approach. To convert that signals into frequency domain we go for transformation techniques. There are so many transformations available in engineering field. Each has its own advantages and at the same times which disadvantages.

**Need for frequency information**

The information that cannot be readily seen in the time-domain can be seen in the frequency domain. Here’s an example from the biological signals. While looking at an ECG signal, the typical shape of a healthy ECG signals is well known to cardiologists. Any significant deviation from that shape is usually considered to be a symptom of pathological condition. This pathological condition, however, may not always be quiet obvious in the original time-domain signal. Cardiologists usually use the time-domain ECG signals, which are recorded on strip-charts to analyze ECG signal. Recently, the new computerized ECG recorders / analyzers also utilize the frequency information to decide whether a pathological condition exits. A pathological condition can sometimes be diagnosed more easily when the frequency content of the signal is analyzed.

**Fourier Transform**

Fourier transform is nothing but the transformation of time-domain signals into frequency domain. But the information that at what times the frequency will occur is not known. This is the main drawback of Fourier Transform.

Need for Time-Frequency representation of the signal, It depends on the particular application and the nature signal in hand. Fourier Transform gives the frequency information of the signal, which means that it tells us when in time these frequency components exist. This information is not required when the signal is so called stationary. But, in normal life handling of non-stationary signals like ECG signals, etc is more. In image, frequency in the sense variation among adjacent pixels.

Fourier Transform gives the frequency components that exist in the signals, nothing more and nothing less. When time localization of the spectral components is needed, a transform giving the Time-Frequency representation of the signal is needed. One ultimate solution is Wavelet Transform. Other transforms like Short Time Fourier Transform (STFT), Wigner distributions etc., also give the time-frequency representation. But in these transforms window size is fixed. So to very long and very short frequencies these transformations are not suitable. In Wavelet Transform, time-domain signal is passed through various high pass and low pass filter, which filter out either high frequency or low frequency portions of the signals. This procedure is repeated, every time some portion of the signal corresponding to some frequencies being removed from the signal.

Consider a signal, which has high frequencies up to 1000Hz. In the first stage, the signal is split up into two parts by passing the signal from a high and low pass (filters should satisfy some certain conditions so called admissibility condition) which results into two different versions of same signal; a portion of the signal corresponding to 0-500Hz (low pass portion) and 500-1000Hz (high pass portion). Then either portion (usually low pass portion) or both is taken, and the same thing is performed again. This operation is called decomposition.

The frequency and time information of a signal at some certain point in the time frequency plane cannot be known. In other words, we cannot know what spectral components exist at any given time instant. The best thing that can be done is to investigate what spectral components exist at any given interval of time. This is a problem of resolution, and it is the main reason to switch to Wavelet Transform from Short Time Fourier Transform. Short Time Fourier Transform gives a fixed a resolution at all times, whereas, Wavelet Transform gives a variable resolution as follows.

**Classifying image data**

An image is represented as a two-dimensional array of coefficients, each coefficient representing the brightness level in that point. When looking from a higher perspective, differentiation of coefficients as more important ones and less important ones. But thinking more intuitively, it is possible. Most natural images have smooth color variations, with the fine details being represented as sharp edges in between the smooth variations. Technically, the smooth variations in color can be termed as low frequency variations and the sharp variations as high frequency variations.

The low frequency components (smooth
variations) constitute the base of an image and the high frequency components (the edges which give the detail) add upon them to refine the image, thereby giving a detailed image. Hence, the smooth variations are demanding more importance than the details. Separating the smooth variations and details of the image can be done in many ways. One such way is the decomposition of the image using a Discrete Wavelet Threshold Transform (DWT).

The DWT of an image

A low pass filter and a high pass filter are chosen, such that they exactly half the frequency range between themselves. This filter pair is called the analysis filter. First, the low pass filter is applied for each row of data, thereby getting the low frequency components of the row. But since the lap is a half band filter, the output data contains frequencies only in the first half of the original frequency range. So, by Shannon’s Sampling Theorem, they can be sub sampled by two, so that the output data now contains only half the original number of samples. Now, the high pass filter is applied for the same row of data and similarly the high pass components are separated and placed by the side of the low pass components. This procedure is done for all rows. Next, the filtering is done for each column of the intermediate data.

The resulting two-dimensional array of coefficients contains four bands of data, each labeled as LL (low-low), HL (high-low), LH (low-high), HH (high-high). The sub band LL and LH measures variations along column, HL measures variation along row and HH measures variations along diagonal. The sub bands LL is the approximation coefficient and LH, HL, HH are the detailed coefficients.

The LL band can be decomposed once again in the same manner, thereby producing even more sub bands. This can be done up to any level, thereby resulting in a pyramidal decomposition. The LL band at the highest level can be classified as most important and the other ‘detail’ bands can be classified as of lesser importance, with the degree of importance decreasing from the top of the pyramid to the bands at the bottom.

III. Modified Set Partitioning In Hierarchical Trees encoder MSPIHT Technique

The main difference from the original SPIHT algorithm concerns the memory structure. The SPIHT algorithm, designed mainly for SW implementation, uses dynamic structures, such as linked lists. On the contrary, the MSPIHT algorithm uses static bitmaps which represent the significance information. The second modification concerns the refinement pass. The original SPIHT algorithm transmits only the elements not added to the LSC in the current sorting pass. In the MSPIHT algorithm, the information of which elements were added last to the LSC is not available. Therefore, the refinement pass is executed before the sorting pass. No extra memory is needed and no additional computation has to be executed.

The modified 3D SPIHT algorithm is as follows:

1. Determine the maximum bit required to code the absolute value of all coefficients in each temporal frame (and all of its children, grandchildren and below) in the coarsest sub band and send them. Set ‘n’ as the number of bits required representing the coefficient with the largest absolute value in binary form.
2. Extract the pixels (coefficients) from the each frame in root node (LLL) that require n bits to code and insert them in LIS and insert the trees associated with them into LIP as type L. Set LSP to empty set. Do not insert frames requiring fewer than n bits to code.
3. Set the threshold as 2n-1-1 so that all the coefficients whose absolute values require n binary bits to represent will be above the threshold and be significant.
4. Sorting pass:
   Check all LIP elements against the threshold, and move all the significant elements from LIP to LSP after sending a ‘1’ and its sign bit. A ‘0’ is sent for each insignificant element in the LIP.

Check all LIS elements for significance.

- For a ‘D’ type tree, send a ‘1’ if one of the children or grandchildren and below is significant, then check each child against the threshold. If a child is significant, output a ‘1’ plus its sign and move it to LSP set; but if a child is not significant, output a ‘0’ and move it to the LIP. If grandchildren exist, move this tree to the end of LIS as type L, otherwise remove it from LIS. A ‘0’ is sent if the entire D tree is insignificant.
- For an ‘L’ type tree, send a ‘1’ if one of the grandchildren and below is significant, remove the parent from LIS add each child to the end of LIS as type ‘D’, otherwise send a ‘0’.
5. Refinement pass:
   Check each of the original elements in the LSP, which are elements in LSP before the sorting pass, against the threshold and output a ‘1’ if significant, and a ‘0’ if
6. Reduce the testing threshold, ‘n’, by 1 bit, and if n>0, then extract the pixels (coefficients) from each frame in the root node (LLL) that require n bits to code, insert them in the beginning of LIP and insert the trees associated with them into the beginning of LIS.

This modified SPIHT algorithm is designed to save some ‘0’ bits by not testing coefficients in frames that are known to be below the threshold. This will increase the efficiency of coding the coarse motion residuals. This design can be translated to 2-D SPIHT in the cases where the large coefficients in each frame are concentrated in certain spatial regions or more bits are required for foveated areas in each frame.

**Figure:** Transformed image represented as tree

Modified Set Partitioning In Hierarchical Trees encoder
In this module, the decomposition of images is encoded in bit by bit level. Here MSPIHT algorithm is used for encoding the decomposition images co-efficient to vector representation. Encoder is performed with respect the some steps like sorting, LIP & LSP etc.

The SPIHT algorithm is based on three concepts:
1) The wavelet-transformed image contains spatial children-parent relationships among the coefficients
2) The tree is descended for significance detection of every wavelet-transformed image coefficient.
3) Similarity between coefficients caused by their parent child relationship allows to mark insignificant coefficient and to transmit the significant ones first.

**IV. IMPLEMENTATION**

**Fig:** Open GUI mode

**Fig:** DWT decomposition
WE studied on a new method of compression on image processing which extracted the noise and knowledge from the image, then obtained the efficient and clear image through the use of compression, encoding, decoding with DWT and MSPIHT and calculating the PSNR value. By applying software MATLAB to write a test program, a ranging test was made. The GUI results proved that the method of Denoising image is simple and effective. It can give the efficient image and high PSNR. In future we can implement with multimedia data like video etc., with MSPHIT approaches.

REFERENCES


