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Research Article

BREAST TUMOR DETECTION USING AR ALGORITHM

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Abstract:

Earlier detection of tumor cells may lead to decrease the highest death incident rates among women. Mammographic images are manipulated and compressed because of the image size posses a big challenge. This paper proposes a multiwavelet based mammographic image compression and multiple thresholds are applied in image enhancement part to increase the contrast of the image. An auto regression process is done to estimate the parameters values which lead to the detection of tumor cells of the mammographic image.

Keywords: Image compression, Mammogram, Neural network, Auto regression.

Breast cancer has the highest death incidence rate among women, ranking next to lung cancer. Experts are of the opinion that mammographic screening is the best tool to detect the cancerous lesions at an early stage. The preservation of high frequency information is important in mammographic images, since the cancer abnormalities like micro calcification correspond to high frequency components of the image spectrum. Interestingly, multiwavelet preserves high frequency information and provides good energy compaction. The challenge still remains in how one can represent the signal in a better way for achieving the best compression and accurate analysis. It proposes the idea of applying multi wavelet for decomposition with coefficient reorganization. The high frequency detailed coefficients from second level to fourth level sub bands are considered for feature extraction. Back Propagation Neural Network (BPN) is used for classification.

II. System Architecture

The below block diagram shows the system architecture of the detection of mammogram images using multiwavelet techinique. At first, the mammogram images are needed to be applying in encoding scheme to change the image to multiwavelet compression form. Then this compressed image is given to the suitable detection method and this method

will give the output of high frequency microcalcification information. The System architecture is shown in Figure 1. This paper defines the following solutions:

i) Multiwavelet based image compression scheme combining the idea of coefficient reorganization and encoding,

ii) Multiwavelet based microcalcification detection scheme.

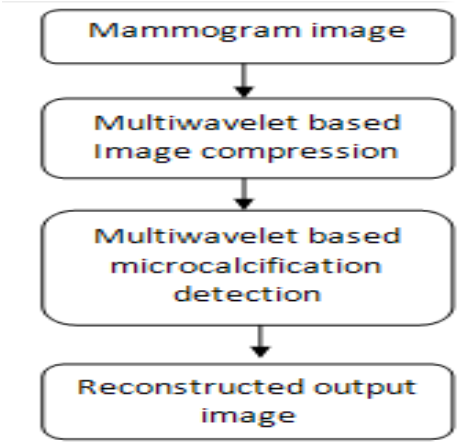

Figure 1: System architecture.

III. Multiwavelet Compression Method.

The wavelet has some basic properties like shifting, scaling, energy conservation, localization, etc. The wavelet can be defined by two functions one is wavelet function also called motherwavelet and another one is scaler function also refered as father wavelet in the time domain. But this Scalar wavelet fails to possess both orthogonality and symmetry properties simultaneously, which are the desirable transform properties in image compression applications. So, we used multiwavelet fuction, it posseses both orthogonality, symmetry properties and also optimal time-frquency with good low and high frequency.

The multiwavelet matrix refinement equations and filter bank details are applied to mammogram image using existing Set Partitioning in Hierarchical Trees (SPIHT) compression. The SPHIT has some properties like good image quality, optimized for progressive image transmission, and provides quantization, ectc. There are two categories of multiwavelets, namely unbalanced and balanced multiwavelets. The multiwavelets which have irregular basis functions and the multiwavelet filter bank that fails to hold the preservation or annihilation property, and that requires prefiltering operation are called unbalanced multiwavelets. The balanced multiwavelet filter banks hold both the preservation and annihilation properties and then balanced multiwavelet does not require a pre-processing stage for the input. After decomposing the image using this filter bank and possesses subbands with spectral characteristics. The balanced

multiwavelets do not require prefiltering operation due to certain desirable properties of their basis functions and this proposed scheme employs balanced multiwavelets for image compression. Comparing with the unbalanced multiwavelets the filter bank are not interleaved prior to signal processing due to widely different spectral characteristics, so we use balanced multiwavelet.The block diagram of balanced multiwavelet based image compression scheme is illustrated in Fig.2. The images are collected from the database and some images collected from hospital.

Then the image is given to the balanced multiwavelet compression. To perform the compression, three balanced multiwavelets produced using the transformation matrix and the three balanced multiwavelets are Balanced Symmetric-AntisymmetricMultiwavelet of length 4; 4 (2) bSA , 4 (3) bSA and Balanced Symmetric-Antisymmetric Biorthogonal Multiwavelet (4/4) b SABMW. Then the compression scheme combines the two ideas. Coefficient reorganization is done to the parent-child relationship output.

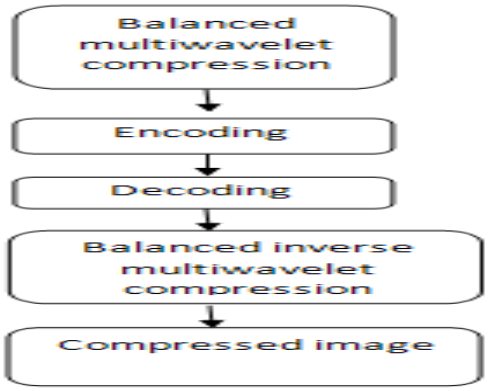

Figure 2: Multiwavelet compression method.

IV. ANALYSIS AND DETECTION OF MULTIWAVELET BASED SCHEME

The proposed scheme consists of three stages: preprocessing, multiwavelet based micro calcification feature extraction and classification using neural network.

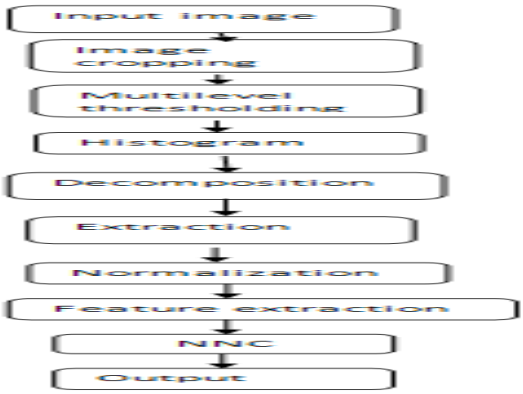

Figure 3: Multiwavelet compression method.

Then the block tree coding algorithm is applied to partitions the reorganized image into coefficient mixed blocks. The decoded coefficients are remixed to occupy their original spatial location. These retrieved remixed coefficients are finally subjected to inverse balanced multiwavelet transform to reconstruct the image. The image obtained by this process is called compressed reconstructed image.

V. Analysis and Detection of Multiwavelet based scheme.

The block diagram of the proposed microcalcification detection system is represented in Figure 3. The mammographic image is cropped at the first step. The cropped image is subjected to multilevel thresholding and histogram equalization to remove the noise and unwanted background. The preprocessed image is subjected to wavelet and multiwavelet decomposition for feature extraction. In the case of scalar wavelets, biorthogonal wavelet bior 6.8 is used as the multiwavelet captures high frequency content better than scalar wavelets in the proposed method, multiwavelet decomposition is performed. Here, the decomposition is performed with balanced multiwavelet 4 (3) b SA with corresponding coefficient reorganization. In case of multiwavelet decomposition the idea of coefficient reorganization and is applied to extract these approximate and detail vectors. Eight statistical features are extracted for each detail sub band. In both wavelet and multiwavelet (coefficient reorganized) decomposed structure, there will be nine subbands from level two to four: three each in horizontal, vertical and diagonal.

VI. Result

The below given results shown the vector classification, values of PSNR and MSE of global and multiple threshold, feature extraction values and auto regression parameters in which these are used to detect the tumor cells efficiently.

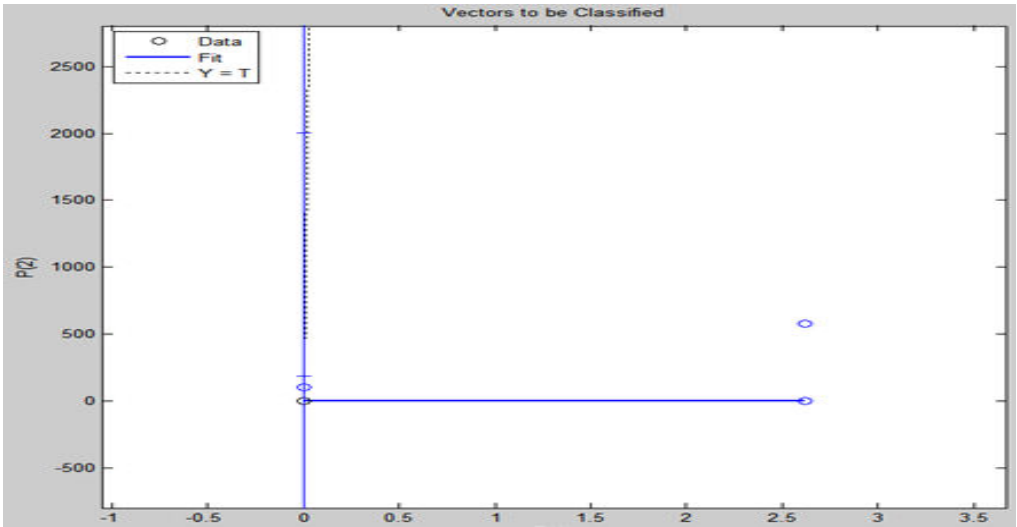

Figure 4: Vector classification.

Table-1: Comparison of Global and Multiple threshods.

Parameters	*Globalthreshold*	*Multiplethreshold*
MSE	0.0223	0.0203
PSNR	64.6461	65.0571

Auto Regression Value

r = -0.5779

m = -2.5461e-06

b = 0.6670

v = 264.6245

Abnormal:Malignant

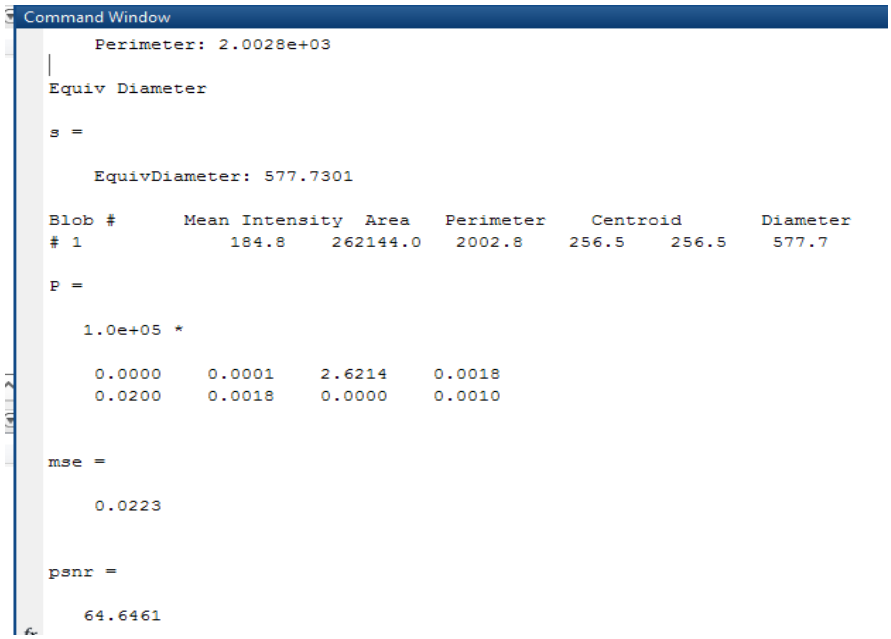

Figure 5: Feature extraction values.

II. Conclusion

The simulation results of both compression and analysis are presented using mat lab R2014a software. Multilevel thresholding is applied in the image enhancement part. After feature extraction, auto regression process is done by using this process we find the psnr values and mean square error values then the Tumor cells can be detected. This leads to improve the output and early detection of the mammogram image. The idea of auto regression process is applied to identify the autocorrelation of series data.

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