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To Detect and Classify the Breast Cancer Using Ultrasonography with Freak Detection Technique

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Abstract –The breast cancer will be detected at early stage which is an important for efficient management of the disease in women.To recognize the breast cancer at in the early stage, we make use of a technique calledUltrasonography.The US used to produce the images of internal tissues. This technique is painless and very safe which is the less expensive method. In this paper we proposed to detect and classify the breast cancer using Ultrasonography with FREAK detection technique.The Ultrasonography image noise will be removed by the adaptive filters. The US images are to be segmented with the help of the Pyramidal watershed segmentation and Fuzzy clustering techniques. FREAK detection technique helps to detect the features from the after completion of the segmentation process.The features set will be extracted based on the method like machine learning features. The recurrent neural network (RNN) classification technique is to be used for classification technique present in this paper. RNN is the artificial neural network which is known as the connections between the nodes from the directed graph along sequence. The simulation and result shows that there is the analysis of the performance with various parameters such as accuracy, true positive rate, false positive rate, true negative rate and false negative rate.

Keywords –Ultrasonography, breast cancer, Pyramidal segmentation, recurrent neural network, FREAK detection, performance analysis

I. INTRODUCTION

The breast has the different tissue which is range from very fatty tissue to very dense tissue.The tissues are present in the network of lobes. Each and every lobe is made up of the tiny and tube like structure which is known as lobules which has the milk glands.The tiny ducts interconnect the glands, lobules and lobes then the carrying milk from the lobes to the nipple.When the cancer will detect from breast at early stagethe healthy cells in the breast will be changed and growing out of control forming a mass or the sheet of cells which are to be called as tumor.The breast cancer will be spreadwhen the

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cancer grows into other parts of the body. The breast cancer cells will be moved to other parts of the body through the blood vessels.The breast canceris to be spread commonly to nearby lymph nodes. This is to be further spread through the body to areas such as bones, lungs, liver and brain.The figure.1 represents the analysis of the breast density which is taken from the Mammogram.

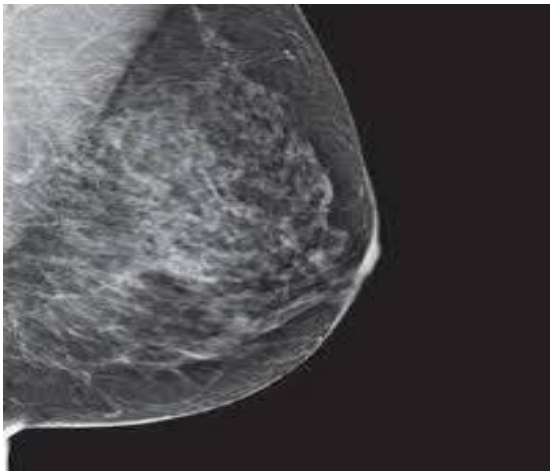

Figure.1 Breast density Mammogram image

1.1 TYPES OF BREAST CANCER

The breast cancer is commonly classified into two types such as invasive or noninvasive. The invasive breast cancer is nothing but the cancer spreads into the surrounding tissues. The noninvasive breast cancer is nothing but there is not go beyond the milk ducts or the lobules in the breast. The breast cancer begins in the ducts orlobes which are called as ductal carcinoma or lobular carcinoma.

- Ductal carcinoma: This cancer begins in the cells lining the milk ducts and develops the major breast cancers. There are following stages are to possible for ductal carcinoma such as ductal carcinoma in situ (DCIS) and invasive or infiltrating ductal carcinoma.
    - Ductal carcinoma in situ (DCIS): This is the cancer which is located only in the duct.
    - Invasive or infiltrating ductal carcinoma: This is cancer which is to spread outside of the duct.
- Lobular carcinoma: this is the cancer which begins in the lobules. This stage has the following stages such aslobular carcinoma in sit (LCIS) and invasive lobular carcinoma.
    - LCIS: it is located in the lobules and it is not to be considered as the cancer. LCIS isthe most risk factors which are to develop invasive breast cancer into the both breast.
    - Invasive lobular carcinoma: It is the cancer which is to spread out of the lobules.

There are common types of the breast cancer will be included such as Medullary,Muncinous, Tubular, Metaplastic, Papillary, and inflammatory breast cancer. There are following subtypes are to be presented in the breast cancer such as hormone receptor positive, HER2-positive, and Triple negative.

1.2 ULTRASONOGRAPHY

The ultrasound or Ultrasonography is the test which the high frequency sound waves are to be passed in the bounced off tissues and these echoes are to be converted into the sonogram that is the image. It is the noninvasive diagnostic tool which is helps to complement the other image modalities. The

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image resolution is to be obtained which is depends on the frequencyof the transducer used.The following physical properties are to be followed in this Ultrasonography.

1.2.1 Physical properties

The inverse relationship exists between the frequency and the wave length of the sound wave.This relationship will be affected with the choice of the frequency which is to be used in each patientwhoisundergoing Ultrasonography.The velocity of the ultrasound wave is an independent of the frequency.This is to be changed which is depends on the medium through which the wave is to be travelled.The image production will be analyzed. The piezoelectric effect is to be followed which is to explain the ultrasound wave is to be generated from the ceramic crystals present in the transducer. The next approach will be followed in the Ultrasonography is the pulse echo principle. The ultrasound wavesare to be producedin pulses which is not continuously the crystals are to be used in this model.In the Ultrasonography, this wave is to be produced with the help of the transducer which interacts with the different tissues with the variety of the ways which helps to hide the image formation. The tissue interaction has the two different types such as attenuation and refraction.Attenuationis the weakening of the ultrasound beam then it passes through the tissues.The refraction will be occurred when the ultrasound beamhits a structure on the oblique angle.Ultrasound does not help on its own as screening process for the breast cancer. It is the best way to determine if the abnormal is solid or fluid fill. The figure.2 shows the image of the breast using Ultrasonography compare with normal and cancer affected.

Figure.2 Breast cancer image with normal and cancer affected ultrasonography

1.3 PYRAMIDAL WATERSHEDSEGMENTATION

The region is to be generated with the help of pyramidal segmentation which are to be merged. The Pyramidal segmentation helps to determine the location and expansion of all images.The blurred images denoted present in the each layer of the pyramid which are used for segmentation. The segmentation has the two stages such as parent child relationship between the adjacent layers and relationship is to be evaluated with the means of similarity measurement.The various segmentation results would be catchedwith the help of the different definitions. This definition is to be presented in

spatial relationship. The figure.3 shows the pyramid image structure in this paper.

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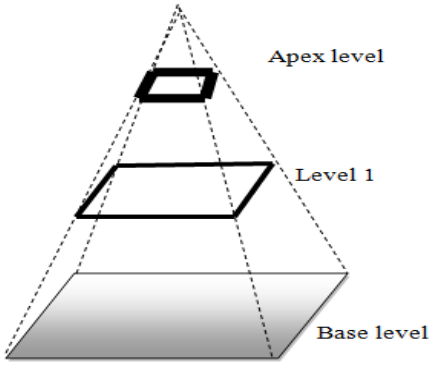

Figure.3 Pyramidal image structure

II. RELATED WORK

L. Sellami [1] et al proposed a breast cancer ultrasound images sequence exploration using BI-RADS features extraction on towards an advanced clinical aided tool for precise lesion characterization.This system is more flexible and convivial analysis present on the multi-slices ultrasound breast cancer lesion with high precision.This method will be allowed to extracting more details about breast cancer lesions which is helps to radiologistto converge high reinforced precision which is to accurate clinical action to formulate. This paper has the following information such as preprocessing and segmentation process in image processing for speckle noise removal, and image segmentation, morphological features extraction in shape class, orientation class, and margin class, texture features extraction in lesion boundary class, echo pattern class, posterior acoustic feature class, and performance analysis.

S. D de S. Silva [2] et al proposed a breast tumor classification in ultrasound images using neural networks with improved generalization methods.This method helps to analyze the performance on the different training.This training has the stop criteria mechanism such as mean square error, early stop and regularization. The features will be selected and also reduced with the help of the scalar selection technique. This scalar selection technique has the correlation method which is to be combined and used in this paper. The paper has the following information such as materials, neural networks, feature extraction, and performance analysis. The simulation and result gives the analysis of the various parameters such as accuracy, sensitivity, specificity and area of theROC.

TamasUngi [3] et al proposed a navigated breast tumor excision using the electromagnetically tracked ultrasound and surgical instruments.This method will be analyzed based on the breast cancer diagnose with various parameters likebreast lesion shape parameter. In this paper, the support vector machine and multilevel perceptronsare to be used for classification analysis with highest accuracy. This paper has the following information such as median filter, active contour, Zernike moment, invariant moment, and support vector machine and performance analysis [4].

HanungAdiNugroho [4] et al proposed a Zernike moment feature extraction for classifying Lesion's shape of breast ultrasound images.This method will be processed with the help of the filtering method using the median filter which is to perform the segmentation process with the Zernike moments and invariant moment. In this paper, there are two classification methods are to be followed such as support vector machine and multilevel perceptrons. This paper has the following information such as median filter, active contour, Zernike moment, invariant moment, support vector machine, and performance analysis. The simulation and result shows that there is the analysis of various parameters such as accuracy, specificity, sensitivity, and classification processing time.

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HestiKhuzaimahNurulYusufiyah [5] et alproposed a feature extraction for classifying Lesion's shape of breast ultrasound images.This paper is to be analyzed both classification methods like support vector machine and multilayer perceptrons. In this paper the first step is to determine the region of interest from the lesion image and the next step is to be filtered which is to reduce the speckle noise.This paper has the following information such as adaptive median filter, ChanVese's active contour, Zernike moment, invariant moment, materials, methods, and performance analysis.

Miguel Bernal [6] et al proposed a vivo quantification of the nonlinear shear modulus in breast lesions with feasibility study analysis.This technique is to be implemented with the measure of the nonlinear shear modulus scheme.In this method, the series of the five nonlinear phantoms are to be needed which is too built with the help of the biological tissues. The tissues immersed in the agar gelatin gel.This paper has the following information such as materials and methods in acoustoelasticity theory in quasi-incompressible media, phantom studies, In vivo studies, and performance analysis.

Feng LIU [7] et al proposed an image registration algorithm based on FREAK-FAST for visual SLAM.This method is to be used for ORB algorithm which helps to binary descriptors takes a breakthrough in the real time.This method combines the FAST algorithm which is on the target image corner which is to be eliminated mismatched pair. This paper has the following information such as image feature matching algorithm, feature detection, feature description, feature matching, and performance analysis. The further development of this paperis to improve the strategy of the FAST threshold which is to accommodate the more conditions.

Dhanshri R. Sonawane [8] et al proposed an improved context dependent logo matching framework using FREAK method. This method will be contributed with the help of the RANSAC present in the retina keypoint (FREAK) descriptor which is to be extracted for the purpose of the matching and recognition process.This detection process will be done based on the methodology of CDS (context dependent similarity). The simulation and result shows the recognition accuracy which is to minimize the error rate performance. This paper has the following information such as CDS with SIFT algorithm, CDS with FREAK algorithm, and performance analysis.

NeetikaSinghal [9] et al proposed an image classification using bag of visual words model with FAST and FREAK.This technique is used for image classification with the help of the BOVW model. This method helps to improve the feature detection and speed up the process. This method helps to be applied using the k-means clustering mechanism.This paper has the following information such as feature detection using FAST, feature extraction FREAK, bag of visual words, supervised vector machine classifier, and data for evaluation, implementation and performance analysis.

Dallan Byrne [10] et al proposed a comparison of the data independent microwave beam forming algorithms for the early detection of the breast cancer.This beam forming algorithm will be developed which is to exploit the dielectric constant which is between the normal and cancerous tissue present in the microwave frequencies. This is helps todetect the tumors.In the breast, the dielectric heterogeneity gives the effects the ability of the beam former which is detecting the very tiny tumors. In this paper, there are three beam forming methods which is to analyze the anatomically system which is derived from the MRI breast model. This paper has the following information such as monostatic delay and sum beamforming, multistate delay multiply and sum beam forming, monostatic mist beam forming, and performance analysis.

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Tom Botterill [11] et alproposed a reconstructing 3-D skin surface motion for the DIET breast cancer screening system.In this paper, the model based segmentation will be used which is helps to analyze the profile of the breast in each image. The 3-D surface is to be reconstructed with the help of the fitting a model to the profiles.This paper has the following information such as DIET imaging system, image based 3-D surface reconstruction, and breast model reconstruction, surface tracking and optical flow estimation, and model based segmentation of breast, 3-D surface reconstruction from profile, efficiency and implementation, quantifying the optical flow accuracy, simulating data to evaluate optical flow accuracy, optimal flow accuracy and locating tumors in phantom breasts.

Qinwei Li [12] et al proposed direct extraction of tumor response based on the ensemble empirical mode decomposition for image reconstruction of early breast cancer detection by UWB.This paper is to be proposed a direct extraction method of tumor response which is based on ensemble empirical mode decomposition. In this approach, the image will be reconstructed for the tumor detection which can be realized with only extracted signals from the detected waveforms. The simulation result shows that there is analysis of the realistic 3-D printed breast phantom. The paper has the following information such as MRI derived breast model, antenna arrangement and simulation process, signal processing, principle of ensemble empirical mode decomposition, parameter selection, tumor response extraction, and performance analysis.

Susan C. Hagness [13] et alproposed a two dimensional FDTD analysis of a pulsed microwave confocal system for breast cancer detection with the fixed focus and antenna-array sensors.This system helps to detect the tumor cells present in the breast.This paper has the following information such as physical basis of the method, technology basis, complementary nature relative to x-ray mammography, background literature, breast tissue detection properties, malignant tumor properties, normal breast tissue dielectric properties, heterogeneity of normal breast tissue, skin and veins, breast geometry, modeling of the fixed focus elliptical reflector system, random heterogeneity of the normal breast tissue, coherent addition antenna array, effect of a directly interposed vein, effect of a directly interposed gland cluster, effect of the normal breast tissue having debye dielectric dispersion, and performance analysis.

Li Ke [14] et alproposed an infiltrative breast cancer initial detection based on the double scale sech template matching.This paper proposed a new mechanismwhich is based on thedouble scale sech template for early which are detecting from the mammographic images.This paper has the following information such as breast region extraction, breast pectoral muscle remove, suspected breast mass regions initial detection, sech template matching algorithm theory analysis, method of breast suspected mass region detection, and performance analysis.

ChadapornKeatmanee [15] et al proposed an automatic initialization for active contour model in breast cancer detection utilizing conventional ultrasound and color Doppler.This method will be designed based on the US based imaging modalities.This method evaluate the initial contour with the help of utilize the fusion of the conventional US and color Doppler. The simulation result shows that there is the analysis of the high accuracy of initialization as well as fast convergence which is to feature of the interest.This paper has the following information such as conventional US in edge map, dark gray region mask, color Doppler in segmentation of vascular flows, filter the common area of the conventional US and color Doppler, eliminating the outliers of the vascular flows, and performance analysis.

A Munawar [16] et alproposed a breast cancer detection using forward scattering radar technique.The breast cancer will be detected with the help of the special mode of the bistaticradar

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systemwhich is known as forward scattering radar. This method is to be analyzed when the Doppler frequency in the received signal which are to be scattered from the tumor because of the cancer detection and localization. This paper has the following information such as forward scattering radar principles, FSR received signal, forward scattering radar architecture, first architecture, second architecture, third architecture, and performance analysis.

Muhammad Hassan Khalil[17] et al proposed a medical field detection of breast cancer by the microwave imaging is a robust tool. The tomography is to be used in this method for detecting the small malignant breast lesions which are to be explored. This paper has the following information such as tumor detection and identification schemes, tomographic imaging system, sequential 2D slice approach, full 3D inversion approach, findings, practical implications and performance analysis.

Douglas A. Woten [18] et al proposed interpreting artificial neural networks for microwave detection of breast cancer.The breast cancer model is to be estimated with the scattering of electromagnetic waves present in the microwave band. This data is to be estimated with the help of the artificial neural network which is to predict the presence of the tumor. This paper has the following information such as methodology, various modules and performance analysis.

Martin O'Halloran [19] et al proposed a quasi multistatic MIST beam forming for the early detection of breast cancer. This paper has the two modificationswhich is to the MIST system which is to develop for the early detection process.When the multi static data will be processed this is based on the traditional data adaptive artifact removal methods. This paper has the following information such as air skin artifact removal, multi MIST beamformer, FDTD data model, and performance of early stage artifact removal algorithm, quasi multistatic MIST beam forming, and performance analysis.

Portieri [20] et al proposed an intra operative terahertz probe for detection of breast cancer.The probe utility helps to reduce the reoperation rates.This is to be designed which is to be acquired THz images during the breast cancer surgery which is to differentiate between normal and malignant breast tissue. This paper has the following information such as background information, handheld terahertz probe, and performance analysis.

III. PROPOSED WORK

We proposed to detect and classify the breast cancer using Ultrasonography with FREAK detection technique. The Ultrasonography image noise will be removed by the adaptive filters. The US images are to be segmented with the help of the Pyramidal segmentation and Fuzzy clustering techniques. FREAK detection technique helps to detect the features from the after completion of the segmentation process. The features set will be extracted based on the method like machine learning features. The recurrent neural network (RNN) classification technique is to be used for classification technique present in this paper. RNN is the artificial neural network which is known as the connections between the nodes from the directed graph along sequence. The figure.4 shows the flow diagram of the proposed method.

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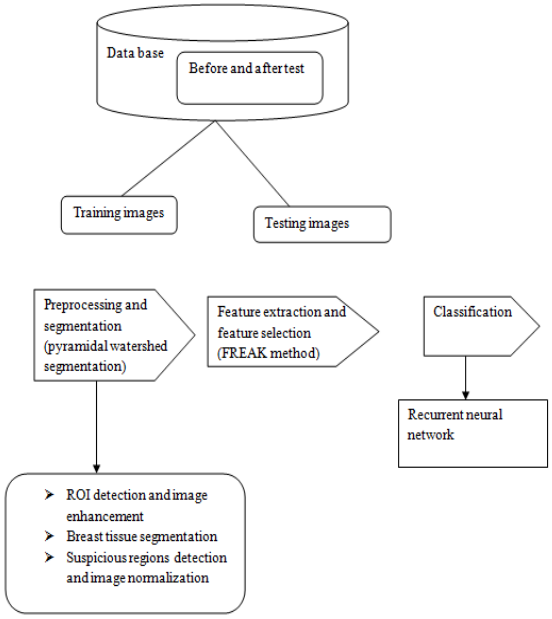

Figure.4 proposed flow diagram

3.1 ULTRASONOGRAPHY BREAST CANCER

The ultrasound image of the breast with the help of the sound waves, it is to produce the images of the internal structures of the breast.It is helps either diagnose the breast lumps or other abnormalities then the doctor may find during the physical examination or breast MRI. This is the secure and safe, noninvasive, painless and does not use of radiation. This image is also called as ultrasound scanning or sonography.

The high frequency sound waves are to be passed from the probe to the body with the help of the gel.The sounds are to be collected by the transducer which is to bounce back and thecomputer. Then these sound waves are creating an image. It produces the image of the internal structure of the breast. During the ultrasound process, physician performing the test will use the Doppler techniques which are to estimate the blood flow in any breast mass. The figure.5represents the ultra sound cystic cancer.

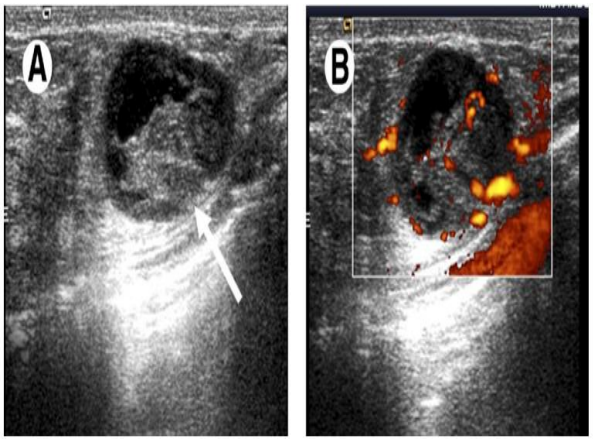

Figure.5 Ultrasound of cystic cancer A) transverse gray scale ultrasound of breast mass B) power Doppler ultrasound of the same mass

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This is an imaging testing which is to be used to look at the inside of your breasts.It can be used when the changes occur from the mammogram.This method helps to determine the problem which is to be obtained by the physical exam. It may be cyst filled with fluid or a solid tumor.This method may be used for below conditions.

- The breast has the particularly dense tissue.To see these tissues with the help of the Ultrasonography.
- The ultrasound does not produce radiation which makes to safer for the fetus.
- The ultrasound may help to analyze the nearby lymph nodes. This is helps to guide the needle during a biopsy.

The ultrasound image is to be used in the cancer screening of the breast which is the second look of the applications.The usual breast ultrasound indicates for the suspicious finding. The ultrasound isto be used for determine very small lesions which are too small. The ultrasound image helps for the high frequency sound waves to form an image which is called sonogram.There are various categories of the breast ultrasound reports are to be presented. The ultrasoundhas the four categories these are to be followed below. This can be usually created by the benign fibrous modules such as breast fibrocystic disease, papillomas, fibroadenomas.This method gives the good indication of the liquid or the solid nature of the lesion or the perhaps a combination.This method is to be used whether a lesion is the cancerous or benign. The figure.6 shows the structure analysis of an ultrasound transducer.

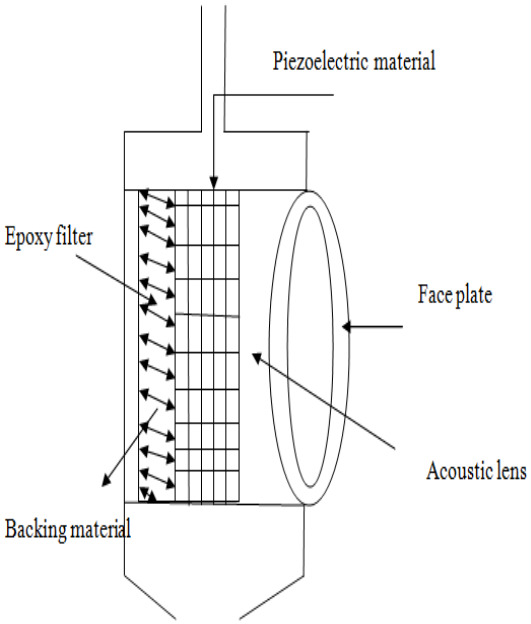

Figure.6Structural analysis of ultrasound transducer

3.2 PYRAMIDAL WATERSHED SEGMENTATION

It is an iterative processof the level which is relative to the nearest lower level.The pyramidal region will be settedwhich the amounts to be created afirst population of regions which has the first level and then iteratively the estimation of this population region. This is to be established of the level N to the level N+1. In this population, this condition will be stopped in order to stabilize.This pyramidal treatment is to be separated into three key stages and these stages are to be followed below. The first stage is original image is to be fragmented present in the homogeneous regions. Second stage, each and every region is to be associated with the class which is to be present in the initial level of the

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pyramid regions. These regions are to be formed after the completion of the classification present in the regions. Final stage, each and every region will make the best possible with the regions. The figure.7 shows the process of the pyramidal segmentation method.

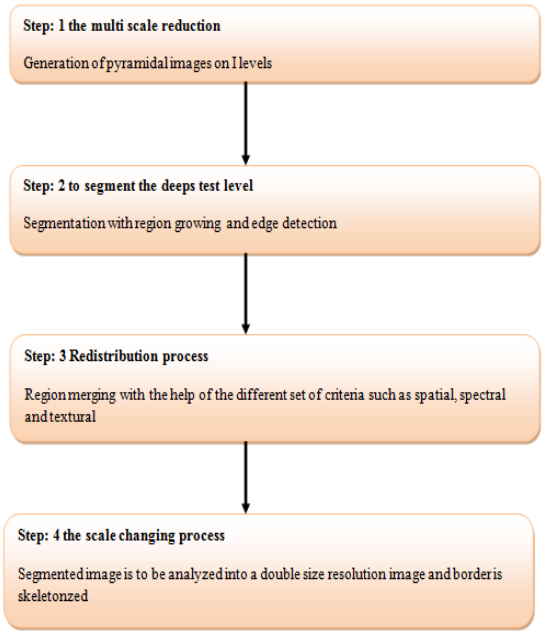

Figure.7 Pyramidal segmentation process diagram

The figure.8 represents the analysis of the pyramidal watershed segmentation method. In the flow diagram, the original image will be taken from the Ultrasonography and then the discrete wavelet transform is to be applied.Then the coefficients are to be processed with approximation with low resolution process. The gray scale morphology will be applied and then the watershed transform is to be applied. The result of the transform is passing through the image projection that is the inverse wavelet transform.

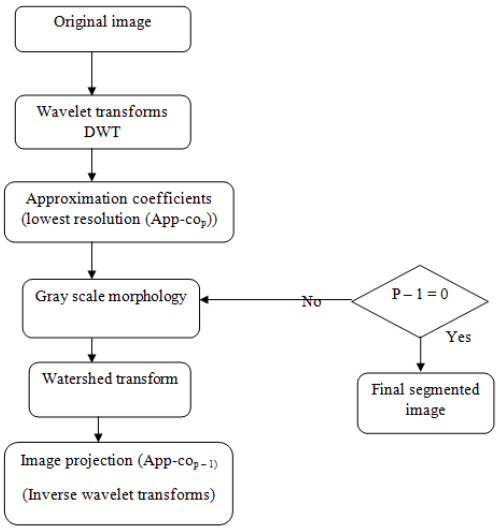

Figure.8 Flow diagram of the pyramidal watershed segmentation

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3.3 Feature extraction using FREAK detection

The feature extraction process will be done from the reduced dimensionality which is to be extracted of the particular feature set from the full size input to the feature vector.The descriptor will be comprised of the three different parts such as sampling pattern, orientation compensation and sampling pairs.The sampling patternis to be usedpresence of FREAK that is retinal it is a circular grid with higher density of the points near the center. From the center, the density of the points will be decreased exponentially. The sampling point is smoothed with a Gaussian kernel which is the radius of the circle which is depicting the size of the standard deviation of the kernel.The FREAK algorithm is the binary feature description algorithm which is to use of the sampling template. It is to be limited retinal structurewhich is to process the descriptor structure of feature point.The binary descriptor, FREAK will be constructedFK with the help of estimating the relation of the Gaussian convolution (DoG) presence of a sampling point.

$$\mathbf{FK} = \sum_{0 \le i \le N} 2^i \, \mathbf{T}(S_p) \quad \text{---------- (1)}$$

Here, S_p denoted as a sampling point pair, N represents for the bit length of the descriptor and T (S_p) satisfies the below formula,

$$\mathbf{T}(S_p) = \begin{cases} 1 & if \left(B(Sp) - B(S_p^{\,2})\right) > 0 \\ 0 & otherwise \end{cases} \quad \text{--- (2)}$$

Here, $B(Sp)$ refers to the brightness of the prior sampling point in S_p.

The flow diagram shows the analysis of the FREAK feature extraction process it is represented in figure.9.

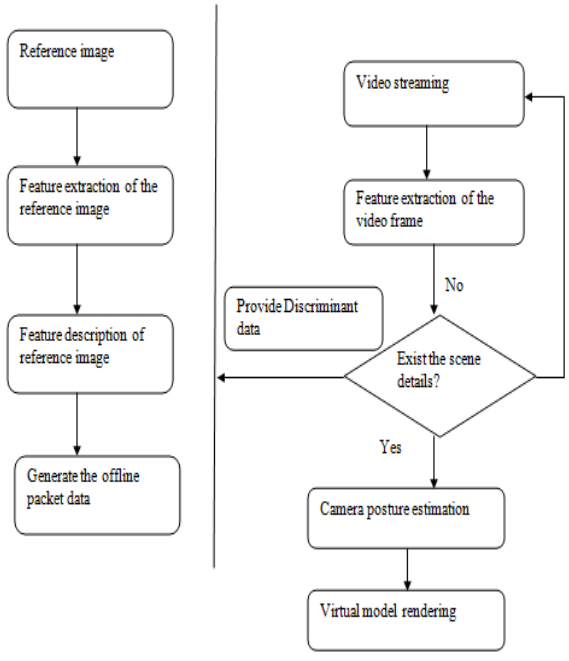

Figure.9 Feature extraction of FREAK detection

3.4 Classification method

The breast cancer is the malignant disease which is caused presence of the uncontrolled growth of the cells present in the breast. The recurrent neural networks are to be used in real time applications for the context dependent pattern classification tasks like speech recognition.There is various

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classification problems depends on the context when the class data is to be received.The classifier has the dynamic featuresof the class present in thelonger duration than the input window which is cause sharpening of the features that should be changed within the window.

3.4.1 Recurrent neural networks

The recurrent neural networks(RNN) are thestate of the art algorithmfor the purposeof processing data.This is the most powerful and robust type of the neural networks. It is the most promising methods which are the moment because there are the only ones present in the internal memory.These methods produce the predictive analysis results within the sequential data. In the recurrent neural network, the information cyclesthrough with a loop.

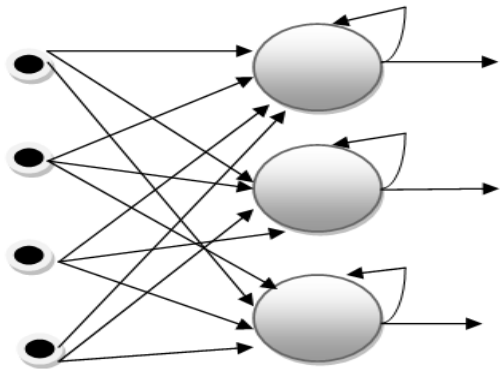

Figure.10 Recurrent neural network

When the decision will be taken, it takes the consideration of the current input and the learned from the input is to be received. The RNN is the short term memory and it is able to remember exactly because of its internal memory. This gives the output and loops it back into the network. This network has the two inputs which is too important because the data sequence has the data which has the crucial information of the coming next stage. The figure.10 shows the mathematical flow of the recurrent neural network process.

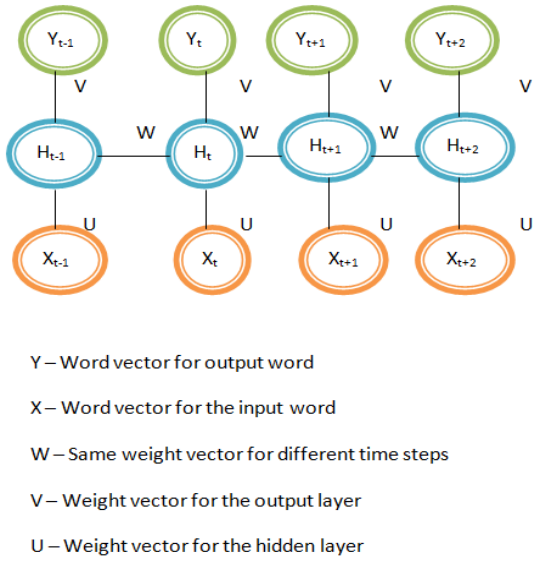

Figure.10 Flow of the recurrent neural network

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In the above figure, the hidden layer timestep (t) values will be evaluated represent in below,

$Hidd_{layer}\_timestep$ = active function (input *Hweights+ W * $Hidd_{layer}\_timestep– 1$)

$Output_{vector}\_timestep$ = softmax (Hweight * $Hidd_{layer}\_timestep$)

Here, the $Hidd_{layer}\_timestep– 1$ denote the previous time step process.

The performance will be analyzed based on the various parameters which are to be represented in simulation and result part. The figure.11 shows the detection method of the recurrent neural network process.

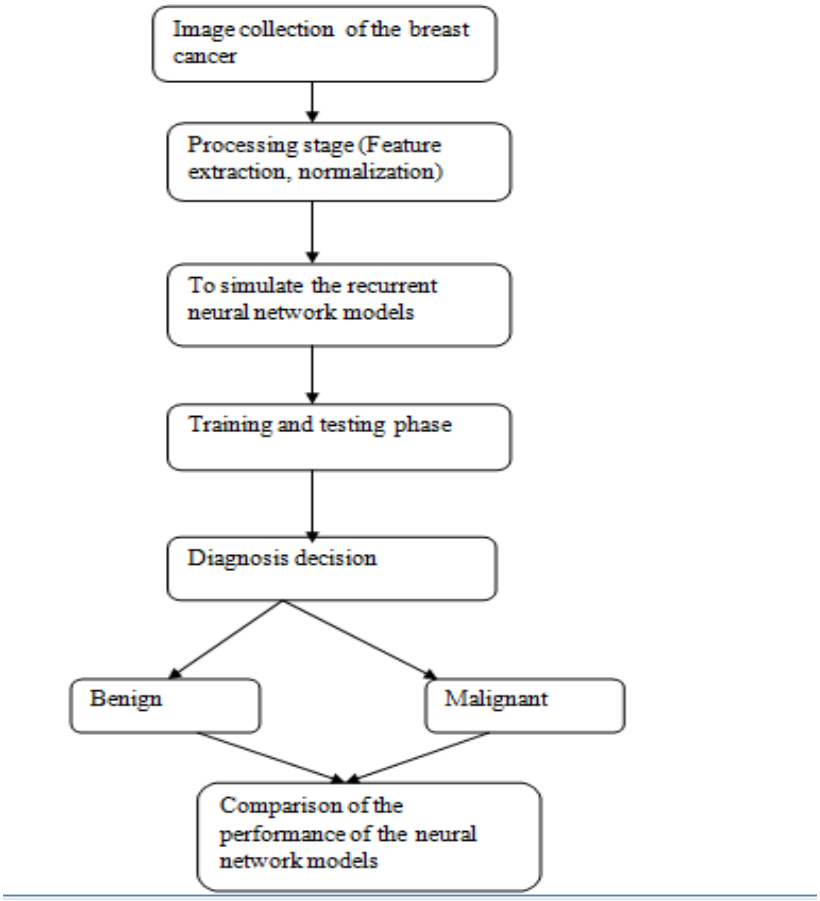

Figure.11 detection method of RNN

IV SIMULATION AND REUSLT DISCUSSION

We proposed to detect and classify the breast cancer using Ultrasonography with FREAK detection technique. The Ultrasonography image noise will be removed by the adaptive filters. The US images are to be segmented with the help of the Pyramidal watershed segmentation and Fuzzy clustering techniques. FREAK detection technique helps to detect the features from the after completion of the segmentation process. The features set will be extracted based on the method like machine learning features. The recurrent neural network (RNN) classification technique is to be used

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for classification technique present in this paper. RNN is the artificial neural network which is known as the connections between the nodes from the directed graph along sequence. The simulation and result shows that there is the analysis of the performance with various parameters such as accuracy, specificity, precision and recall. The table.1 shows the confusion matrix analysis of the breast cancer [21].

Table.1 Confusion matrix for breast cancer

Test		Predicted	
		Negative	Positive
Actual	Negative	p	q
	Positive	r	s
Accuracy (Accy)		(p + s) / (p + q + r + s)	
True positive rate (TPR)		s / (r + s)	
False negative rate (FNR)		r / (r + s)	
False positive rate (FPR)		q / (p + q)	
True negative rate (TNR)		P / (p + q)	

The table.2 shows the analysis of the cancer prediction levels and the figure.12 shows the prediction analysis graph for existing and proposed method. Our existing method is diagnosis, prediction and prognosis of the prediction of the breast cancer using the artificial neural network.

Table.2 breast cancer prediction levels

Testing data set [21]					
Existing actual class	Existing predicted class		Proposed actual class	Proposed predicted class	
	Negative (Benign)	Positive (Malignant)		Negative (Benign)	Positive (Malignant)
Negative (Benign) = 184	138	46	Negative (Benign) = 185	125	59
Positive (Malignant) = 55	44	11	Positive (Malignant) = 55	30	25

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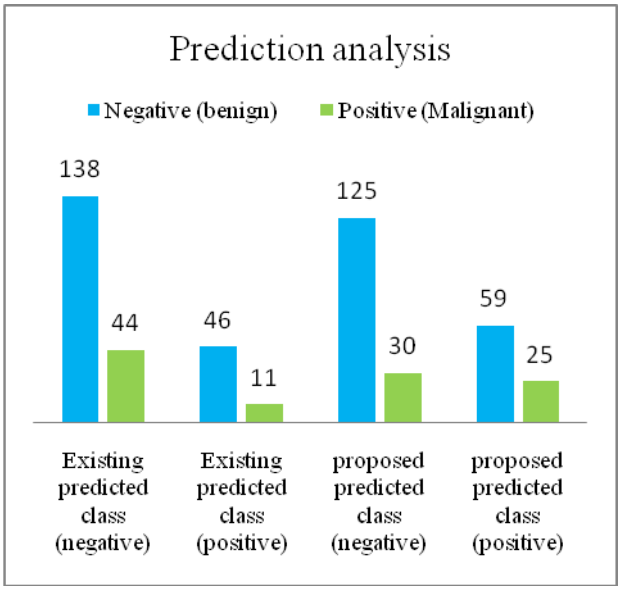

Figure.12 Analysis of the prediction levels

Table.3 Experimental result analysis of the existing method

S.No	TPR (%)	TNR (%)	FPR (%)	FNR (%)	Accuracy (%)	Training time (sec)
1	19.63	74.24	25.76	80.37	49.79	66.37
2	19.63	74.24	25.76	80.37	49.79	73.79
3	19.63	74.24	25.76	80.37	49.79	102.20
4	19.63	74.24	25.76	80.37	49.79	19.2031
5	19.63	74.24	25.76	80.37	49.79	47.43

Table.4 Experimental result analysis of the proposed method

S.No	TPR (%)	TNR (%)	FPR (%)	FNR (%)	Accuracy (%)	Training time (sec)
1	22.3	85.1	29.2	82.4	67.53	60.21
2	22.3	85.1	29.2	82.4	67.53	69.2
3	22.3	85.1	29.2	82.4	67.53	85.2

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4	22.3	85.1	29.2	82.4	67.53	10.2
5	22.3	85.1	29.2	82.4	67.53	37.2

The table.3 and table.4 shows the experimental analysis of the existing and proposed method. The figure.13 represents the analysis of the various parameters compare with existing and proposed method.

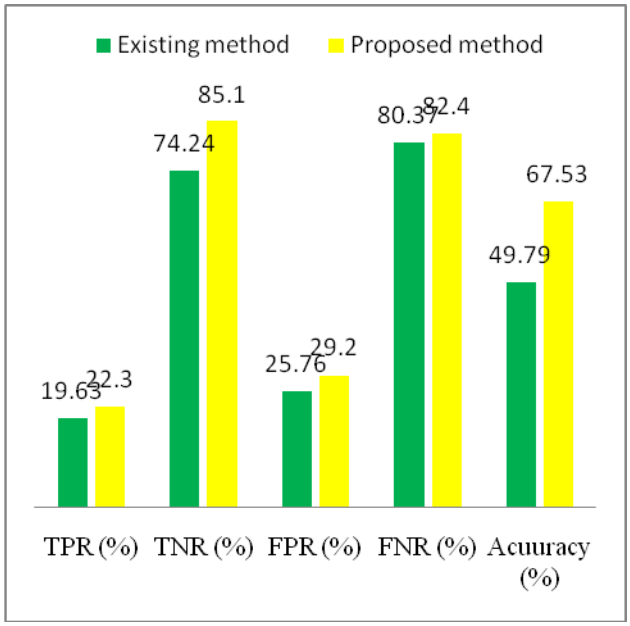

Figure.13 Various parameters analysis

V. CONCLUSION

We proposed to detect and classify the breast cancer using Ultrasonography with FREAK detection technique. The Ultrasonography image noise will be removed by the adaptive filters. The US images are to be segmented with the help of the Pyramidal watershed segmentation and Fuzzy clustering techniques. FREAK detection technique helps to detect the features from the after completion of the segmentation process. The features set will be extracted based on the method like machine learning features. The recurrent neural network (RNN) classification technique is to be used for classification technique present in this paper. RNN is the artificial neural network which is known as the connections between the nodes from the directed graph along sequence. The simulation and result shows that there is the analysis of the performance with various parameters such as accuracy, true positive rate, false positive rate, true negative rate and false negative rate. The simulation result givesthe better result compare with the existing mechanisms.

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