

# Detection of Calcification Using Filter in Mammograms – A Survey

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**Abstract**—Microcalcification is one of the key symptoms facilitating early detection of breast cancer. In this paper image are acquisition from the mini mias database and perform various steps they are image enhancement, feature extraction and classification .In image enhancement the images are enhanced using filters and the features are extracted from the enhanced image using Gabor filter, and classify the micro calcification using support vector machine to classify the masses into benign, malignant, normal.

**Keywords**—mammograms,imageenhancement, feature extraction, classification.

## I. INTRODUCTION

Breast cancer is one of the common cancers among women in this world. It is second biggest cause of death.Troughout 50,000women and 400 men are identifyingwith breast cancer each year. Breast cancer represents 19 % of death and 24% of other cancer in the European Community [1,2].The effective detection method of breast cancer is mammography. So the proposed method employs the textural patterns for robust and clear representation of masses. Here we employ histogram equalization for image enhancement .To enhances the image with contrast and brightness. While using of histogram equalization spreading most frequent intensities values effectively for feature extraction .Then apply enhanced image to the Gabor filter for feature extraction with different scales and orientation. The extracted features are classified as benign or malignant using support vector machine SVM for classification of the extracted image. To identify the mass as benign malignant or normal for early

detection of breast cancer. This paper organized as follows in section 2 we present the proposed system. Subsequently section 3 we present comparative study of previous work. Finally section 3 is conclusion of this work.

## 1. BREAST CANCER

Breast cancer is one of the second leading causes cancer related death among women in the world,it develops from the breast cell. The death rate can be reduced from the early detection of cancer.The early detection of breast cancer which leads to the chance of survival. Screening mammography is the current method to detect the breast cancer earlier.The breast cancer starts from the inner linings of milk ducts or the lobules that carry the milk to a nipple. There are two types of breast cancer can start offnamely ductal carcinoma and lobule carcinoma. The cancer starts from the milk ducts are ductal carcinoma or the cancer starts from the lobules are lobule carcinoma. Most of the cancer starts from the ductal.

The breast is like other part of the body it contains billions of micro cells. These cells can be multiplied in orderly fashion and news cell can be replaced by old dead cells. In cancer this order was goes wrong and the new cells are not need to the body and the old cells do not die these extra cells .these extra cells form a masses of tissue is called growth or tumor. The tumor can be classified two types they are benign

and malignant. Benign is normal masses and the malignant are cancerous. And the malignant tumor is spread to other parts of the body.

The invasive and non invasive are the two types of breast cancer. The cancer cells are out from the lobules or milk ducts and spread to nearby tissues of the body is called invasive cancer. When the cancer is still inside its original place and has not broken out. Lobular carcinoma is in it's inside the lobules, while ductal carcinoma is in its original place when they are still inside the milk ducts. Sometimes this type of cancers is called pre cancerous.

## **2. MAMMOGRAPHY**

Mammography is a X-ray to inspect the human breast by using screening and diagnostic tool. It is the method to detect early stage of breast cancer. The mammogram is a X-ray image of our breast on mammography. The screening mammogram is used to check the breast cancer having no signs and symptoms of diseases. It takes two views of each breast a craniocaudal (from above) and a mediolateral oblique (from the sides). After that the signs and symptoms are found means to test the breast cancer by using diagnostic mammogram and evaluate the abnormalities of the breast. It takes two or more views of each breast using angles, or special coned views of certain areas. During mammograms the breast is compressed into two plates. And X-ray pass through the breast and film plate is capture the image and displayed in the computer screen.

## **3. DATABASE**

All the mammogram images are obtained from the mini MIAS (Mammographic Image analysis society) database. The images have 50 micron pixel edges is taken from the UK national breast

screenings programmed and the database has been reduced to a 200 micron pixel edges[20]. The database contains 322 mammogram images consisting of 208 normal, 63 benign, and 51 cancer images. These images were in 24-bit PGM format with image size is 1024x1024.

## **II METHODS**

### **1. Image Enhancement**

The image enhancement is used to improve the image perception of information on the image for human viewers for the better inputs. The objective of the image enhancement is to modify the attribute of the image. In the image enhancement here we use the histogram equalization. It is used to improve the quality of the image and mainly used to reduce the extra brightness and darkness of the images. It produces a more in uniform manner distributed histogram so the image would become much clearer. The Input images are assigned by the intensity values of the pixels such that the output image had a same distribution of intensities. So the result of the histogram equalization is uniform and the contrast is increased from the images.

### **2. Feature Extraction**

Feature extraction is the important step to detect the breast cancer. To obtain the feature extraction takes the image from the database and extracts the feature from that image. The performance of the system is used for the optimal parameter of the classifier is to separate the normal and abnormal tissue by using the feature vector. The mammograms contain texture patterns of different scales and orientations. These patterns are useful to separate from mass and non

mass. So here we use the Gabor filter technique used to extract the feature effectively.

Since we extract texture features using Gabor filter, first a brief overview of Gabor filter is necessary for a deep understanding of the producer for feature extraction

### **Gabor Filter**

The Gabor filter is the linear filter used for edge detection. It is represented by frequency and orientation that is similar to the human visual system and they have been found by appropriate for texture representation and discrimination. The Gabor filter is defined by sinusoidal waves and multiplied by a Gaussian function. The interesting property of the Gabor filter is optimal localization of both spatial and frequency domain[17].

A filter will have stronger response to an edge where the normal are parallel to the orientation. In order to extract textural patterns of mammograms, Gabor filters can be used with distinct orientations and scales, and thus provide a powerful tool for the representation of textural properties of masses at different scales and orientations. A Gabor filter bank contains multiple Gabor filters tuned with different parameter settings (scaling, orientation and central frequency).

### **3. CLASSIFICATION**

The method has the objective to classify each image of one of two classes the masses benign or malignant. Classifications have the assignment to an unknown pattern of a predefined class, according to the pattern presented in the form of a feature vector. There are many classification techniques exist. After feature extractions of the mammogram images and classify

the benign or malignant or normal it helps to predict the texture feature it plays an important role in classification. Here we use the technique for the classification is Support Vector Machine (SVM).

### **Support Vector Machine (Svm)**

Support vector Machine is supervised learning models with associated learning algorithms that analyzes data and recognize patterns used for classification theregion. The SVM is one of the most recent methods designed to solve binary classification problems. It is a kind of large margin classifiers and it is vector based machine learning methods. It's to be a part of positive and negatives examples from each other with maximum margin, which means, the distance between the decision surface and the closest example is maximised. The optimal hyper-plane is separated. and the data is belonging to various classes with large margins. To find a decision boundary of two classes that are maximally far from any point in training data[14]. The distance between two classes is the sum of distance and it is defined as margin. The SVM is based on statistical learning theory and has attractive generalization capabilities in linear as well as non-linear decision problems.

### **III Overview Of The Previous Work**

<b>METHODS</b>	<b>REMARKS</b>
Gabor filter with adaptive strategy and user relevance feedback[4].	Used to extract the texture feature and adaptive strategy is proposed for feature selection, filter selection and future

	weighting.This uses a users relevance feedback to reduce the redundancy.
Sequential difference of Gaussian filter(DoG)[7].	To detect the microcalcification clusters.and compare the several microcalcification detect in each mammogram and all microcalcifications are in single cluster.
Gabor Cancer Detection Alogorithm[3].	Used to test large sample of mammograms.To detect early stage masses and calcification.
Region of Interest,Gabor filter Support Vector Machine[8].	To extract local spatial textural features from digital mammograms using different configuration , resolution and classify them as malignant ,bengin,normal.
Dual tree complex wavelet(DT-CWT),Sationary Wavelet Transform and top- hat transform[9].	Helps provide a good performance due to more data phase information,shift varience,and directionality.and compared with other techniques.

Gabor filter,Support Vector Mahine(SVM)[10].	Helps to address the multiscale and multi orientation textural properties of masses.And 10 fold cross validation is used in classification achived Az=0.995,and the accuracy is 99.60.
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Dyadic wavelet,Fuzzy shell clustering.[5]	The image quality enhancement using multirresolution Analysis to detect the MCs.The nodular components is used to achieve accurately 95% of the detection were correct.
Roi, daubechies,symlets,biorthogonal, neural network.[6]	Used to crop the image and analysis the texture using various filters.The combined feature vector isfed to the classification.And it is achieved 85% of over all classification.
Ant Colony Optimization (ACO) and Genetic Algorithm (GA)[18].	Used to detect breast border and nipple.Cross over and mutation operators are used to generate mated string.To evaluate the performance by FROC curve and the result produced Az (0.94)
Wavelet transform ,Therasholding procedure[19].	Used to detect the microcalcification the detection directly is used by wavelet and no inverse transformation.

#### IV CONCLUSION

In this survey paper, method of detecting breast cancer by using mammogram image has been studied and discussed. This study is used to evaluate the mammogram contains micro calcification.This helps forfocusing the future develops in the field of medicalimage processing. Here detailed explanation aboutseveral techniques of medical image processing

inbreast cancer detection. This paper mainly dealswith the information about the various stages of detection such as image enhancement,feature extraction,and classification.

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