ABSTRACT

In India, in the year 2013 around 5, 55, 000 people died due to cancer. Cervical cancer is the most common form of cancer among Indian women. The second leading type of cancer, which causes death among women, is breast cancer. The most recent report tells us that breast cancer accounts for 25% to 33% of all cancer types in women. Every 30-35 new cases per 1,00,000 women are affected with breast cancer each year. Indian Council of Medical Research (ICMR) has predicted that the incidence of breast cancer will overtake cervical cancer by 2020.

The advancement in computerized medical scenario has grabbed the attention of researchers to work in the field of medical image processing. Medical imaging refers to the techniques and processes that are used to create images of the human body for clinical purposes or to study the normal anatomy and physiology. It typically involves the processing of heterogeneous data which is primarily concerned with extracting useful information from the medical images. It is an emerging area of medical image processing that helps the medical practitioners in diagnosis and surgery planning. Enhanced medical image is required to represent the information in a precise way and it should be flexible and affordable. It is mandatory for the radiologists to have a proper knowledge of technical aspects and clinical impact of image processing.

A tumor is caused by abnormal or uncontrolled growth of mass cells. Due to damage or inherited mutation and rapid growth of abnormal cells in the breast, causes breast cancer. The most effective imaging modality for early breast cancer detection is Mammography. The best imaging technique is
diagnostic mammography which is powerful in detecting precancerous features in breasts before the person or the doctor feels them.

Mammography involves the use of ionizing radiation with radiographs of each breast performed in two planes: mediolateral oblique and craniocaudal. It helps us to locate the tumor and check for evidence of cancer in other areas of the breast. The assessment and description of the mammographic findings are done as per standardized lexicon known as the Breast Image Reporting and Data System (BIRADS). The important features observed from the mammogram are masses, calcifications and distortion. The breast cancer mortality is considerably reduced due to the detection of abnormal lesions at early stages and appropriate treatment.

The subjective quality of the image is degraded due to the existence of noise, so it gives an incorrect decision. To extract the suspicious features and diagnosis the abnormalities based on quality assessment parameters. The mammographic images may analyze in three stages, namely preprocessing, segmentation and classification. Development of a wide range of filtering algorithms for preprocessing may cause unpleasant visual artifacts. The importance of breast cancer detection is to reduce different noises which are commonly found in the mammographic images and provides better image quality. The proposed Non Subsampled Shearlet Transform (NSST) algorithm uses multidirectional and multidimensional products to correct the pixels which are weakly defined and also simultaneously improve the contrast and preserve the details. An enhanced image is provided by the system, if the input medical data is of low contrast. However, the results show that the proposed NSST algorithm can preserve the edges and textures very well while weakening the noise, which can obtain better suppressed and enhances objective of evaluations than other noise removal methods.
Segmentation is one of the most important tasks in image processing. It consists in classify the pixels into two or more groups depending on their intensity levels and a threshold value. The quality of the segmentation depends on method applied to select the threshold. The proposed Robust Support Vector Machine (RSVM) algorithm provides a new mammographic image analysis model in order to detect the cancer affected area in the breast. The main idea of RSVM is to solve the over-fitting problem with outliers which makes the two classes non separable. Adaptive Neuro-Fuzzy Inference System (ANFIS) algorithm is proposed for the classification of mammographic image, the objective of ANFIS is to integrate the best features of fuzzy systems and neural networks. The proper feature selection reduces the number of input features, computational cost and improvement in the prediction system.

The Electro-Magnetism-like Optimization (EMO) algorithm is an evolutionary method which mimics the attraction-repulsion mechanism among charges to evolve the members of a population. EMO demonstrates interesting search capabilities and also maintains a low computational overhead. ANFIS classifier is a simple data learning technique that uses Fuzzy Logic to transform given inputs into a desired output. It is done through highly interconnected Neural Network processing elements and information connections, which are weighted to map the numerical inputs into an output. The performance of assessment quality is significantly improved by increases the number of input samples and nodes.

A Multilevel Thresholding Electro-Magnetism-like Optimization (MTEMO) algorithm takes large number of sample from a feasible search space inside the mammographic image histogram. This approach generates a MTEMO segmentation algorithm which can effectively show the threshold values of a mammographic image within a reduced number of iterations and
decreasing the computational complexity. LS-SVM is used to find an optimal hyper plane is obtained by using maximum Euclidean distance to the nearest point which separates normal and abnormal breast cancer. Thus, the enhanced mammographic image with classification helps radiologists for accurate diagnosis and consistent of interpretation of images.