ABSTRACT

Breast Cancer is the most common malignancy in women and is the second most common leading cause of cancer deaths among them. At present, there are no effective ways to prevent and cure breast cancer, because its cause is not yet fully known. Early detection is an effective way to diagnose and manage breast cancer and can give a better chance of full recovery. Mammography has proven to be the most effective tool for detecting breast cancer in its earliest stage and it continues to be the primary imaging modality for breast cancer screening and diagnosis. Furthermore, this tool allows the detection of other pathologies and may suggest the cancer nature such as normal, benign or malignant.

This thesis gives a clear idea of extracting features from the mammogram image to find cancer affected area which is a crucial step in breast cancer detection and verification. Combinations of algorithms were used to find the cancer cell area in mammogram image. Those are extracted directly from the original gray scale mammogram with steps of image processing algorithms.

The first step in the identification process is image segmentation. Segmentation is the process of separating the foreground regions in the image from the background regions. Most algorithm findings for cancer cell detection works well in binary image. Binarization is the second step in the process that converts a gray level image in to binary image. This improves the contrast of an image. Followed by this the Thinning is used to get the skeletonised version of binary image. Image post processing step starts with gray scale extending. It is basically improving the interpretability or perception of information in an image for human viewers and providing better input for other automated image processing techniques. Next gray scale extending of a mammogram image is performed in order to make it more suitable for finding the tumor cell location in the breast. Hence, the present research work is undertaken for early detection of breast cancer in mammographic images.

To remove background noise or variation in illumination, local thresholding technique is carried out. These two operations perform well for visual upgradation of mammogram image. Later the image processing steps like triangulation yields the location of different
contracts cells in an image. This gives extra aid to radiologists to detect and classify the mammograms of breast cancer.

Since breast cancer originates from inner lining of milk ducts, currently the location, tissue background and image characteristic of breast cancer was studied in three phases. First phase, is converting the gray scale image in to binary image, the second phase is visual upgradation. Third phase deals with Euclidean Distance Transformation through image triangulation. The results indicate that the importance of effectively displaying information in the lighter areas of the mammogram with sufficient contrast of mammogram image. The resulting computerized breast cancer detection system will subsequently act as a second reader after the manual detection by the radiologist and it is believed that this would aid the radiologist in the mammogram screening process.

This approach clearly gives the effective way to obtain the area of cancer in a breast during the screening. The proposed methodologies give good quality outputs without loss of information. It has been focused that the combination of algorithms work with less time complexity for even highly degraded images. The best time complexities of these algorithms are obtained if the expected results are obtained at initial algorithm itself. The worst case is the maximum number of sub algorithms that are carried out to improve the results. Thus the algorithm gives an accuracy of 99.66% and above in many cases of images and gives 100% accuracy in the case of quality image.

**Keywords:** Mammogram Image, Breast Cancer, Cancer detection, Medical Imaging, Binarization, Thinning, Gray Scale Extending Algorithm and Euclidean Distance Transformation.