

Breast Cancer Detection using Deep-learning

Problem Statement

With being the most common type of cancer in women, breast cancer accounts for 14% of cancers in Indian women. It is reported that with every four minutes, an Indian woman is diagnosed with breast cancer. Breast cancer is on the rise, both in rural and urban India. A 2018 report of Breast Cancer statistics recorded 1,62,468 new registered cases and 87,090 reported deaths. Cancer survival becomes more difficult in higher stages of its growth, and more than 50% of Indian women suffer from stage 3 and 4 of breast cancer. Post cancer survival for women with breast cancer was reported 60% for Indian women, as compared to 80% in the U.S. Therefore it is important that we can detect the Cancer at an early stage then there is an increased chances of it getting cured. So this project lays a foundation in making the detection of the cancer automated so that more and more people can get it diagonised early so as get cured.

Background

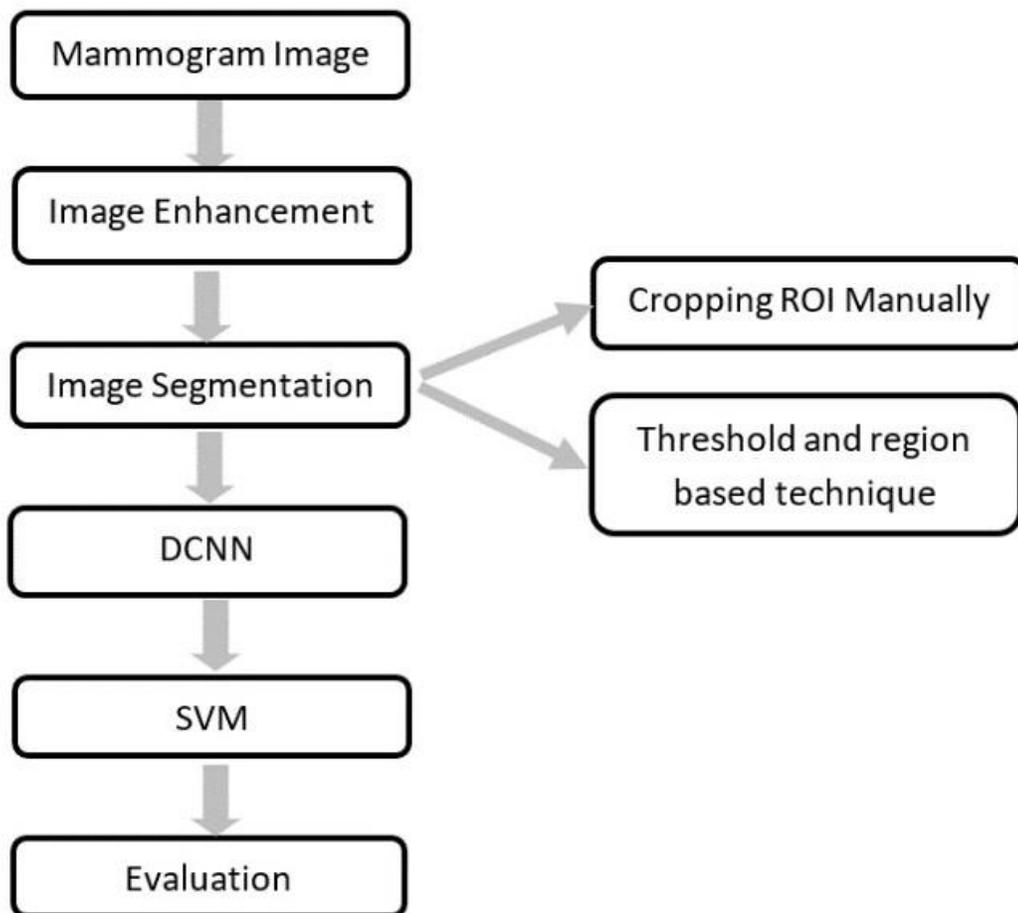
The signs of detection are Masses and micro calcification clusters which are important in early detection of breast cancer. Micro calcification are nothing but tiny mineral deposits within the breast tissue. They look similar to small white colored spots. They may or may not be caused by cancer. Masses can be many things, including cysts (fluid-filled sacs) and non-cancerous solid tumors, but they could also be cancerous. The difficulty in cancer detection is that the abnormalities from normal breast tissues are hard to read because of their subtle appearance and ambiguous margins. Automated tools which can help radiologist in early detection of breast cancer. Further we have classified the cancer into three categories after its detection- Normal, Malignant, Benign.

Methodology

Our system consists of following steps :

- **Image Enhancement:** Image enhancement is processing the mammogram images to increase contrast and suppress noise in order to aid radiologists in detecting the abnormalities.
- **Image segmentation:** Image segmentation is used to divide an image into parts having similar features and properties. The main aim of segmentation is to simplify the image by presenting in an easily analyzable way. Some of the most popular image segmentation methodologies are edge, fuzzy theory, partial differential equation (PDE), artificial neural network (ANN), threshold, and region-based segmentation

- **Feature Extraction:** There are many techniques for the feature extraction step. In recent years, deep convolutional neural networks (DCNN) have attracted great attention due to their outstanding performance. Consequently, in this DCNN is used.
- **Feature classification:** In this step, the ROI is classified as either benign or malignant according to the features. There are lots of classifier techniques; such as linear discriminant analysis (LDA), artificial neural networks (ANN), binary decision tree, and support vector machines (SVM). In this manuscript, the SVM is used because it achieved high classification rates in the breast cancer classification problem.
- **Evaluation for the classifier:** There are several evaluation tools to assess a classifier amongst them, is the confusion matrix, the accuracy, the receiver-operating curve (ROC), the area under the ROC curve (AUC), the precision, and the F1 score. In this project we



- try to achieve all.

Dataset:

Available on kaggle.

Evaluation Measures

Evaluation is measured in terms of SENSITIVITY, SPECIFICITY, ACCURACY, Mean Square

Error.

Software and Hardware Requirements

Python based Computer Vision and Deep Learning libraries will be exploited for the development and experimentation of the project. Tools such as Anaconda Python, and libraries such as OpenCV, Tensorflow, and Keras will be utilized for this process. Training will be conducted on NVIDIA GPUs for training the Deep Convolutional neural network for cancer detection.