Welcome

Breast Cancer Detection using Machine Learning

Presented by;
Sneha R
4PM22MC046

Outline

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Introduction of the Project

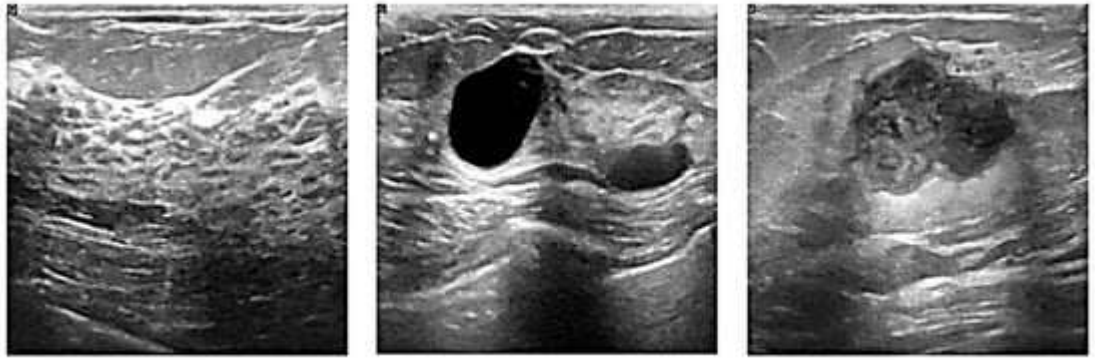
- Breast Cancer is a cancer that develops the breast tissue
- Breast cancer is a disease in which malignant (cancer) cells form in the tissue of the breast
- When the tumour is diagnosed as benign ,doctors will leave it alone rather than remove it.
- We assume that men do not get breast cancer ,It affects women only –MYTH
- It is estimated that approximately 2,190 men diagnosed every year with breast cancer and 410 die ,
- But compare to women this is nothing

Existing system

1.The primary key in women’s survival from breast cancer is early detection and proper treatment.

2. Body image-based technology includes Magnetic Resonance Imaging (MRI), mammography, and ultrasound that obtain the breast structure image to be examined and evaluate the abnormality of the breast by the radiologist.

3. Ultrasound imaging (sonogram) is a medical tool that uses a high frequency of sound waves (echoes) to obtain real-time images of the body’s internal structures or detect suspicious nodular formations without involving ionizing radiation compared to MRI and mammogram.



Normal Benign Malignant

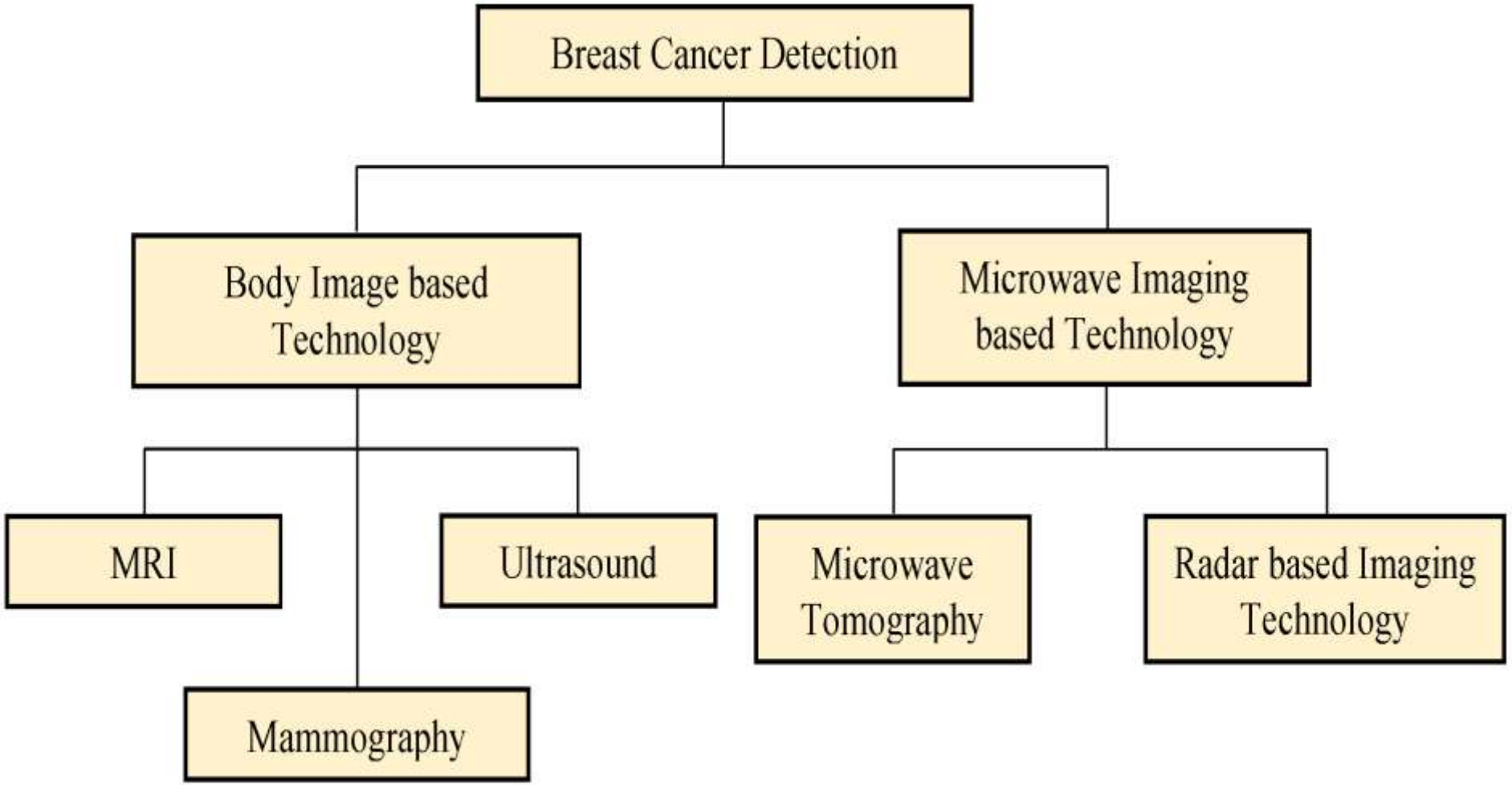


Fig. Existing System of Breast cancer detection

4.Mammogram, also called mastography, is a low-dose energy X-ray (ionizing radiation) procedure to produce images (radiographs) of the breast.
5. Magnetic Resonance Imaging (MRI) is a medical imaging technique that records changing strong magnetic fields and radio waves to produce detailed images of the organ
and soft tissues of the human body
6. Alternative technology has focused on breast cancer detection research involving Microwave Imaging (MI) in the recent decade to overcome the inconvenience, accessibility, high risk, and cost associated with X-rays and MRI

Proposed System

The following steps are performed for model building and evaluation:

1.Input Image.
2.Pre-Processing.
3.Feature Extraction.
4.Classifier.
5.Output Images.

Software requirements:

- Operating System : Windows 10/11
- Programming Language : Python
- Screen Revolution :1200 x 800
- Platform : Google Collab

Hardware requirements:

- Processor :64 bit
- Ram :8GB
- Hard disk :250GB

Flow Chart

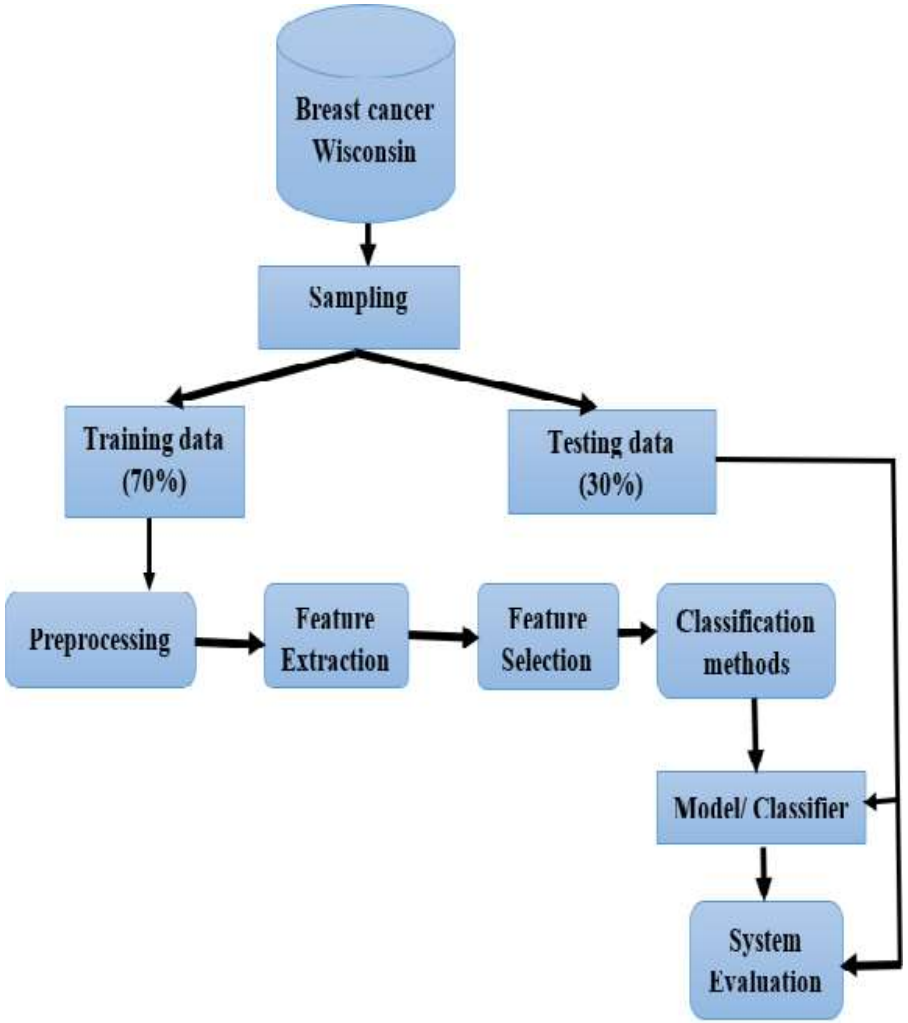


Fig. data flow diagram of breast cancer detection

Algorithm used

Convolution Neural Network(CNN)

Architecture Of CNN

1. Convolutional Layer

This layer is the first layer that is used to extract the various features from the input images.

2. Pooling Layer

The primary aim of this layer is to decrease the size of the convolved feature map to reduce the computational costs.

3. Fully Connected Layer

The Fully Connected (FC) layer consists of the weights and biases along with the neurons and is used to connect the neurons between two different layers. These layers are usually placed before the output layer and form the last few layers of a CNN Architecture.

4. Dropout

Usually, when all the features are connected to the FC layer, it can cause overfitting in the training dataset. Overfitting occurs when a particular model works so well on the training data causing a negative impact in the model's performance when used on a new data.

5. Activation Functions

Finally, one of the most important parameters of the CNN model is the activation function. They are used to learn and approximate any kind of continuous and complex relationship between variables of the network.

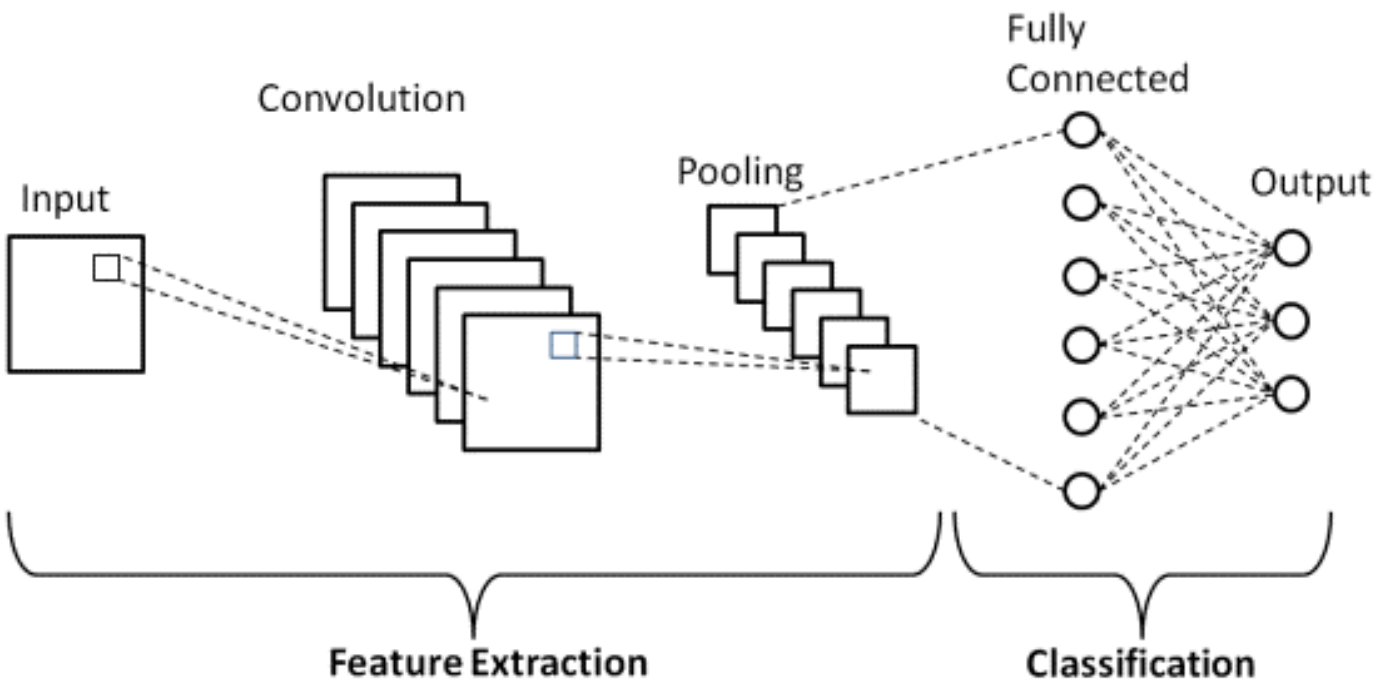
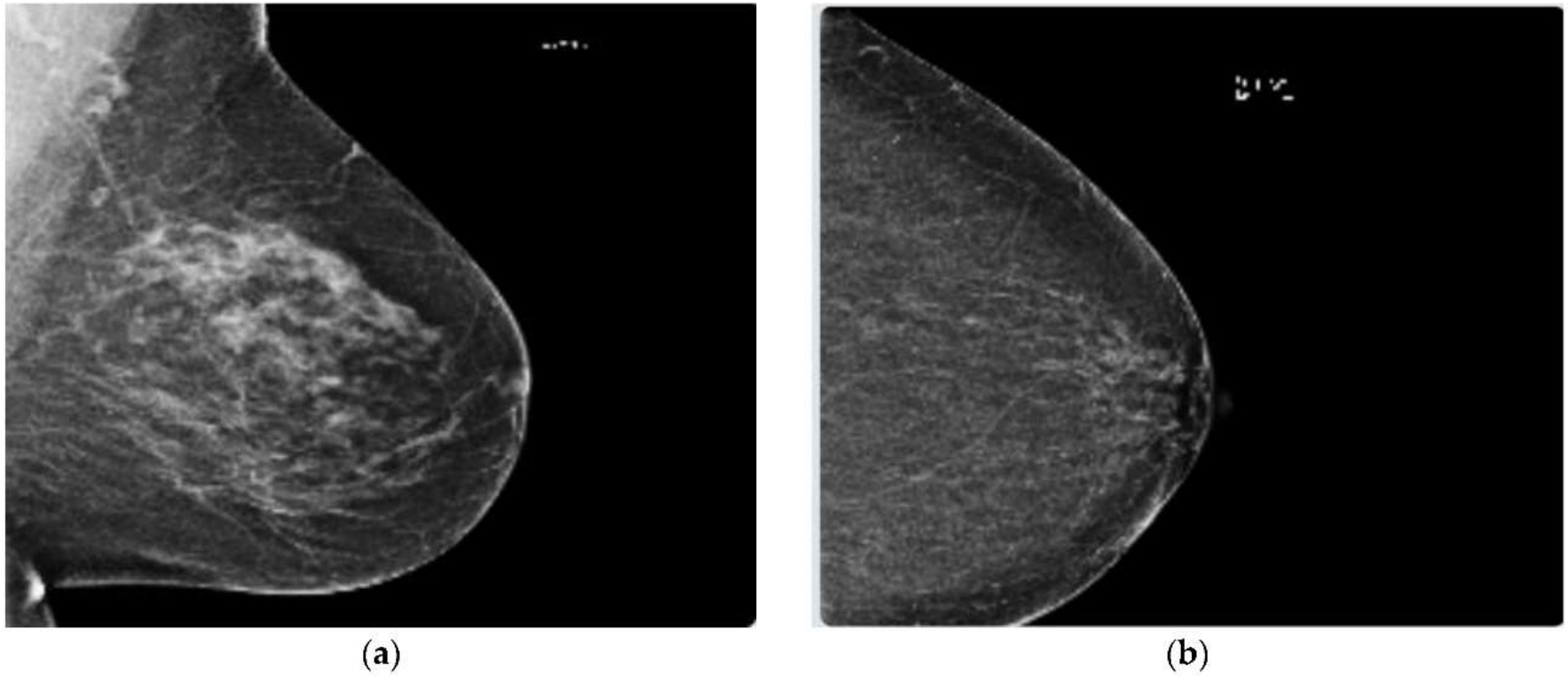


Fig. Architecture of CNN Layer

Results



(a) (b)

Fig. These figures show two sample images (a) cancerous (b) Normal

Future enhancement

- These algorithms can analyze large datasets of images and medical records, identifying subtle patterns that might escape the human eye.
- ML models could spot cancer earlier, increasing survival rates and allowing for less invasive treatments.
- ML can refine analysis, potentially lowering the number of unnecessary biopsies and anxieties caused by false positives, while also catching more cases currently missed.
- Tailoring screening based on individual risk factors, age, and breast density could optimize detection for each patient.
- Combining ML with advanced imaging techniques like 3D mammography or MRI could further enhance accuracy.

Conclusion

- This project holds significant potential to significantly impact the fight against breast cancer.
- It gives accurate diagnoses, personalize care, and ultimately improve patient outcomes.
- This project not only addresses critical public health concern but also contributes to the advancement of medical technology and paves the way for further innovations in the field.
- We examined different machine learning techniques for breast cancer detection. We performed a comparative analysis of CNN, KNN, SVM, Logistic regression, Naïve Bayes and Random forest.
- It was observed that CNN outperforms the existing methods when it comes to accuracy, precision and also size of the data set.

Thank you