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Breast Cancer Detection from Ultrasound Images using Residual UNET and Differential Analysis

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ABSTRACT: Breast cancer diagnosis typically relies on the examination of tissue samples obtained through biopsy. Enhancing the accuracy and efficiency of detecting cancerous cells is crucial for early-stage identification and treatment. This study presents a computer-aided breast cancer detection system that analyzes microscopic biopsy images using advanced image processing and deep learning techniques. Initially, RGB biopsy images are converted into grayscale to simplify analysis. Texture features are then extracted using the Gray Level Co-Occurrence Matrix (GLCM) to determine parameters such as contrast, correlation, energy, and homogeneity, along with the Gray Level Run Length Matrix (GLRLM), which provides features including short run emphasis (SRE), gray level non-uniformity (GLN), run length non-uniformity (RLN), and run percentage (RP). A Convolutional Neural Network (CNN) classifier is employed to categorize the processed images into cancerous and non-cancerous groups. The effectiveness of the detection model is evaluated by comparing the classification accuracy obtained from GLCM and GLRLM features. Similar methodologies have been applied successfully in various medical image analysis applications, such as tuberculosis and malaria detection, tumor identification in CT scans, and cancer cell recognition in microscopic samples. The proposed approach demonstrates potential as a reliable aid for pathologists in breast cancer diagnosis.

KEYWORDS: Breast Cancer Detection, Biopsy Image Analysis, Image Processing, GLCM, GLRLM, Texture Feature Extraction, Convolutional Neural Network (CNN), Computer-Aided Diagnosis, Microscopic Images, Medical Image

I. INTRODUCTION

Breast cancer remains one of the most common and life-threatening diseases affecting women worldwide. Early detection plays a vital role in improving survival rates, as timely diagnosis allows for more effective treatment and management. Traditionally, the identification of cancerous cells is performed manually by pathologists through microscopic inspection of biopsy samples. However, this manual procedure is time-consuming, prone to fatigue, and may result in subjective or inconsistent outcomes. Recent advancements in medical imaging and artificial intelligence have significantly enhanced the capability to support clinical decision-making. Computer-aided diagnostic (CAD) systems have emerged as an efficient approach to assist specialists by analyzing tissue samples automatically and providing quantitative insights. Among these methods, texture-based feature extraction techniques and deep learning models have shown great potential in identifying abnormalities in microscopic images.

II. LITERATURE SURVEY

The framework depicts the Extraction and Segmentation of sputum cells in sputum pictures utilizing, separately, a limit classifier, a Bayesian order and mean move division. Our strategies are approved and contrasted and other focused procedures by means of a progression of experimentation led with an informational index of 100 pictures. The extraction and division results utilized as a base for a CAD framework for early location of Breast cancer malignancy

which improve the odds of survival for the patient. Favorable position is the Bayesian order permits an exquisite and methodological assurance of the characterization parameter. The equivalence of the execution with respect to the shading design uncovers close scores for histogram goals. Drawback is at the present stage, the mean move strategy creates a sensible precision above 87%, yet this execution can be additionally improved by means of further fundamental morphological preparing on the divided picture. By the by, the sputum pictures are described by boisterous and jumbled foundation designs that reason the division and programmed discovery of the malignant cells profoundly risky.

III. PROPOSED SYSTEM

The The proposed system is an automated computer-aided diagnosis (CAD) framework designed to classify breast biopsy images into cancerous and non-cancerous categories using texture feature analysis and deep learning. The architecture combines classical texture descriptors derived from Gray Level Co-Occurrence Matrix (GLCM) and Gray Level Run Length Matrix (GLRLM) with a Convolutional Neural Network (CNN) classifier to enhance diagnostic accuracy and robustness.

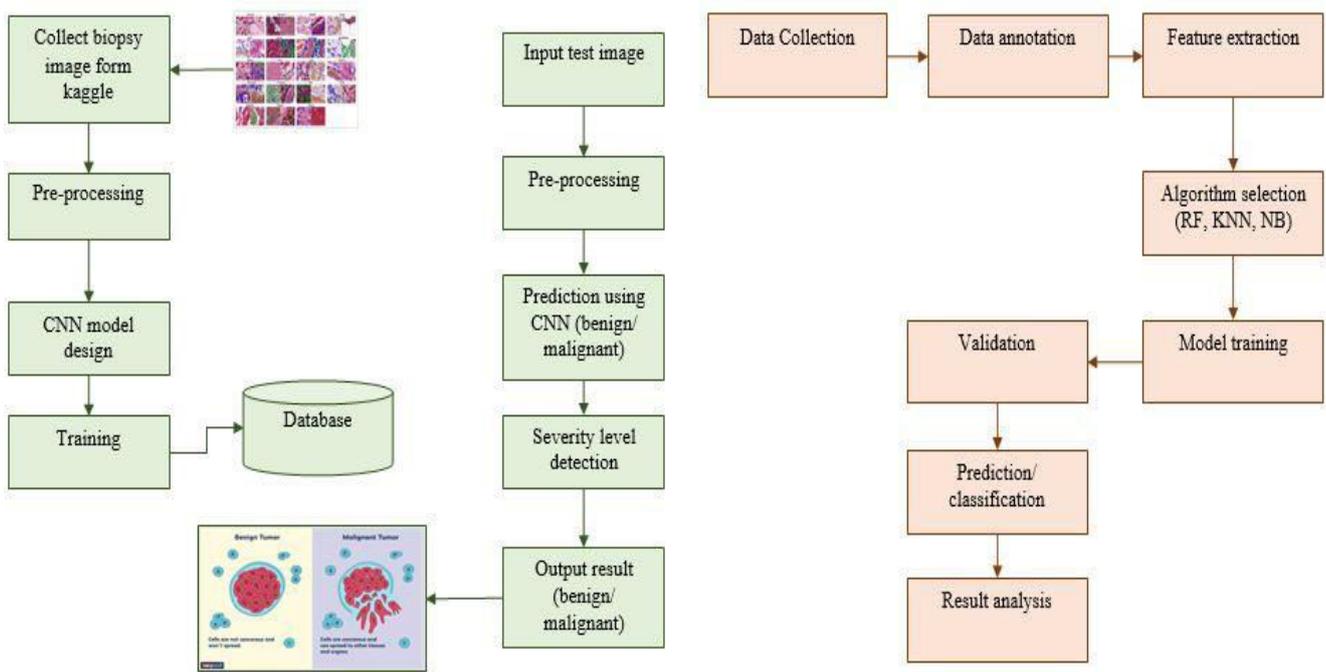


Fig:1 System Architecture

Architecture

Fig:2 Block diagram for Hybrid

IV. EXPERIMENTAL RESULTS

The proposed experimental setup is designed to evaluate the performance of the proposed breast cancer detection system using microscopic biopsy images. The entire experiment is conducted in a controlled computing environment with necessary software libraries and toolkits for processing, feature extraction, and deep learning classification abnormalities.

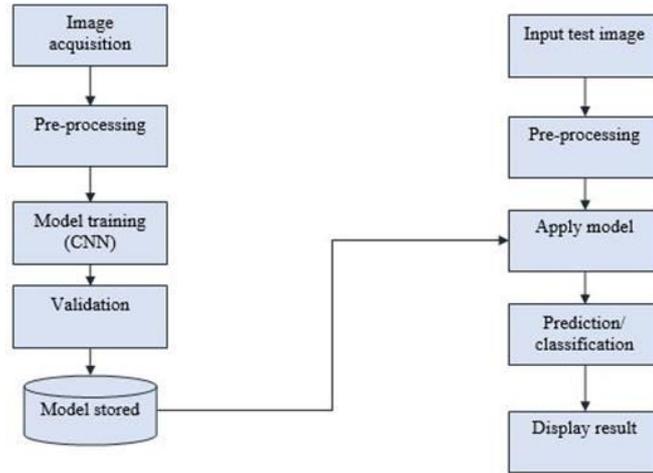


FIG:3 IMAGE ACQUISITIONS EXPERIMENTAL SETUP

V. PERFORMANCE ANALYSIS

The Image Acquisition module forms the initial stage of the proposed framework, where high-quality histopathological images of breast tissue are collected. These images are obtained from digitized biopsy slides and stored in standardized formats to enable consistent analysis. Ensuring proper acquisition is essential, as variations in image quality, such as blurriness, poor lighting, or staining irregularities, can adversely influence the performance of the system. During this phase, images are gathered from both benign and malignant tissue samples to produce a balanced dataset with diverse cancer patterns. Expert pathologists provide annotations and labels that confirm the diagnostic class for each image, allowing the dataset to be used effectively for supervised learning. Uniformity in magnification levels, slide preparation, and staining methods is maintained to avoid feature distortions that may mislead the classification model. To improve dataset robustness, multiple publicly available datasets and clinical image repositories may be incorporated. Along with image data, relevant metadata—such as patient identification codes, staining type, or clinical comments—can be stored to support extended analysis. The collected images are then organized and indexed systematically, ensuring seamless retrieval and management throughout the training and evaluation stages.

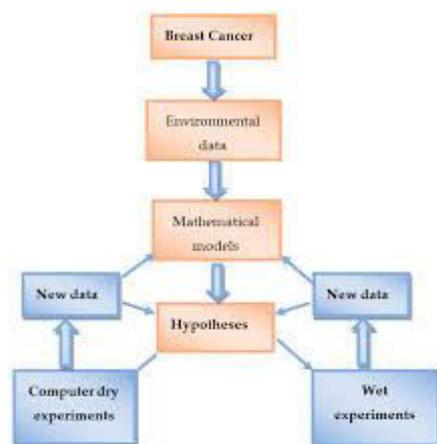


Fig:4 Real Time comparative analysis

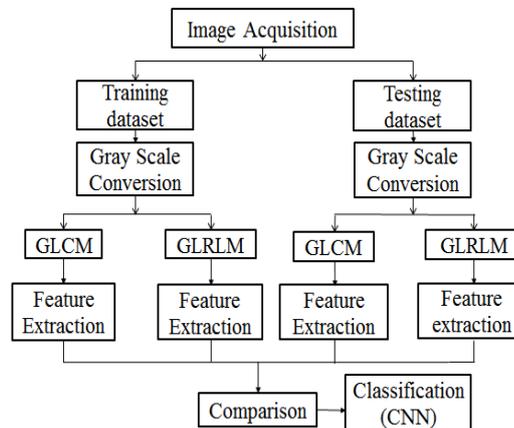


Fig:5 Analysis of different Systems

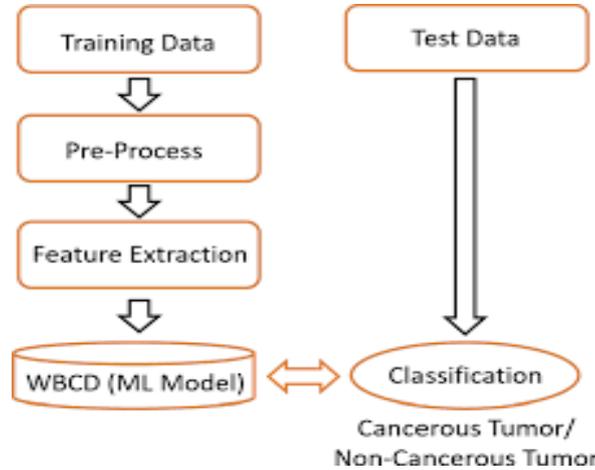


Fig:6 Model Progression

VI.CONCLUSION

This project Calculations are connected with presumptions, for example, topsy-turvy property of CXR and knobs speaks to are just Breast cancer disease knobs. This exploration has effectively built up an arrangement of tiny Breast cancer biopsy picture examination to recognize Breast cancer disease.

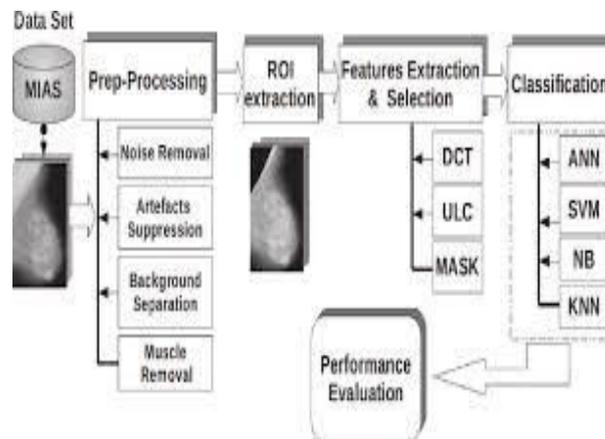


FIG:7 OUTPUT FOR CANCER MODULE

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