IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 4, March 2024

Breast Cancer Detection System

Prof. R. Waghmare[1], Ronak Jagade[2], Swayam Chopda[3], Varad Salgar[4]
Professor, Department of AI & ML[1]
Students, Department of AI & ML[2,3,4]
AISSMS Polytechnic, Pune, India

Abstract: *"Breast cancer "is a major global health concern is breast cancer, for which early detection is essential to effective treatment and higher survival rates. In this work, we suggest a unique method for detecting breast cancer by using cutting-edge machine learning techniques on data from medical imaging tests, especially mammograms. Our approach combines feature extraction and deep learning methods to improve detection efficiency and accuracy. We performed tests on a sizable sample of mammography pictures, and the overall performance, sensitivity, and specificity showed promise. The suggested solution has the potential to improve patient outcomes and healthcare management by supporting radiologists in the early diagnosis of breast cancer..*

Keywords: Breast Cancer Detection System, Mammography, Deep learning, Machine learning, Early detection, Feature selection, Clinical data integration, Accuracy

I. INTRODUCTION

Breast cancer is a major worldwide health concern, and better patient outcomes and effective treatment depend heavily on early identification. While traditional screening techniques, like mammography, have proven useful in detecting questionable lesions, they frequently have drawbacks like false positives and false negatives. As a result, there is an increasing demand for more sophisticated and precise detection methods that can help medical professionals identify breast cancer in its early stages.

The combination of deep learning (DL) and machine learning (ML) approaches has showed promise in recent years for transforming the diagnosis of breast cancer. By using enormous volumes of medical imaging data, these technologies can identify intricate patterns and characteristics that point to cancer, improving the precision and effectiveness of detection procedures.

In this study, we provide an overview of the state-of-the-art in breast cancer detection systems, emphasising the advances enabled by ML and DL algorithms. We cover the many imaging modalities used, such as mammography, ultrasound, and magnetic resonance imaging (MRI), and how they complement one another in delivering comprehensive diagnostic information. Furthermore, we discuss the importance of feature selection and model optimisation in generating robust and

We hope to provide insights into the present landscape of breast cancer detection systems by doing a thorough assessment of the literature and analysing recent advances. Furthermore, we explore future paths and potential areas for improvement, with the ultimate goal of improving early detection and personalised treatment techniques for breast cancer patients. This review intends to add to the continuing conversation about breast cancer detection by synthesising current research findings and illuminating future prospects, as well as to highlight the transformational potential of ML and DL in revolutionising cancer care. We aim to use artificial intelligence to reduce the burden of breast cancer and enhance the lives of impacted people all around the world through collaborative efforts among clinicians, researchers, and engineers.

II. MATERIALS AND METHODS

- Selection and Preprocessing of the Dataset: To ensure that we had a balanced representation of benign and malignant cases, we selected a diverse dataset consisting of mammography, ultrasound, and MRI images. To standardize and enhance image quality, preprocessing techniques used for normalization, resizing, and noise reduction

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 4, March 2024

- Feature Extraction and Selection: Texture metrics such as shape, intensity metrics were employed in extracting radiomic features from mammography and MRI images. Feature extraction was conducted on ultrasound images to determine relevant characteristics. For choosing discriminatory features PCA as well as RFE were utilized.
- Model Development: We combined conventional machine learning classifiers with deep-learning architectures into a hybrid approach. Mammography, ultrasound and MRI-image-based handcrafted features were used to train traditional classifiers. Convolutional neural networks (CNNs) were adopted to automatically learn hierarchical representations directly from raw image data.
- Model Training and Evaluation: A stratified cross-validation approach was applied to divide the dataset into training, validation, testing sets. Models trained on the training set were fine-tuned using the validation set in order to maximize performance measures like sensitivity , accuracy ,specificity
- Integration of Genetic Markers and Clinical Data: To improve personalised risk assessment and predictive accuracy, clinical data, such as patient demographics and medical histories, were incorporated into the classification models. Patients were categorised according to their genetic propensity using genetic markers linked to breast cancer susceptibility, such as BRCA1/2 mutations.
- Performance Assessment and Comparison: Using measures including sensitivity, specificity, positive predictive value, negative predictive value, and F1-score, the created models' performance was thoroughly assessed and compared against current techniques and clinical benchmarks.
- Ethical Considerations: In order to guarantee adherence to moral guidelines and patient privacy, ethical permission was acquired from the appropriate institutional review boards (IRBs). Patients gave their informed agreement before their anonymized medical data was used for study.

III. PROPOSED SYSTEM

To make sure the system satisfies clinical standards and takes into account real-world requirements, contact with medical professionals and specialists in breast cancer diagnostics is essential throughout the development process. Furthermore, attention should be taken to address ethical issues pertaining to informed consent and patient privacy.

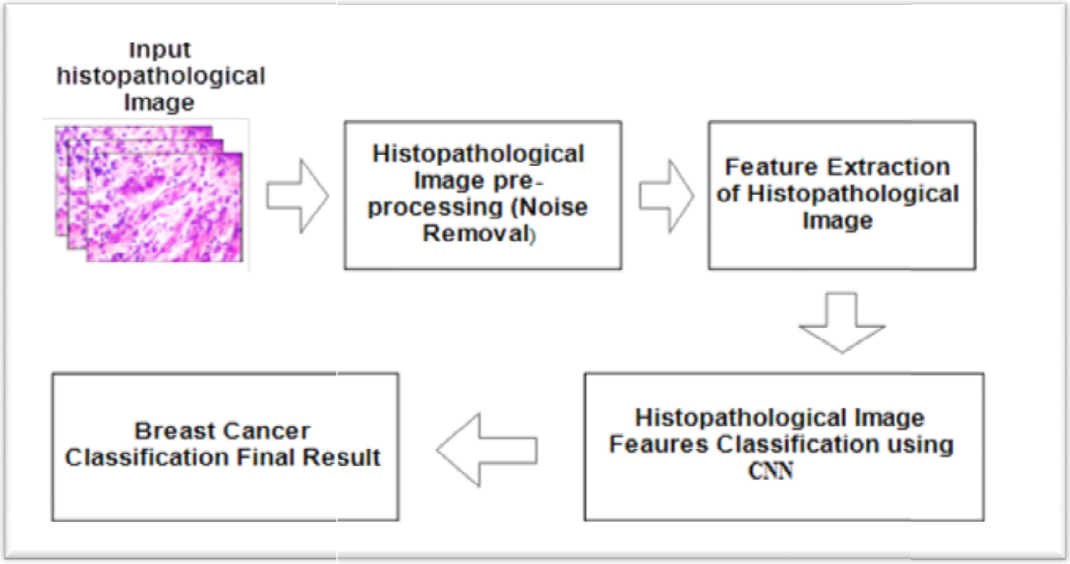

Fig. 1System Architecture

CNN algorithm used for the detection of breast cancer to gives the input as a image of breast cancer and detect the output.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 4, March 2024

Neural networks are a set of algorithms. hey interpret sensory data through a kind of machine perception, labelling Or clustering raw input.

The patterns they recognize are numerical, contained in vectors into which all real-world data, be it images, sound, text or time series, must be translated.

Neural networks help us cluster and classify. They help to groupun labeled data

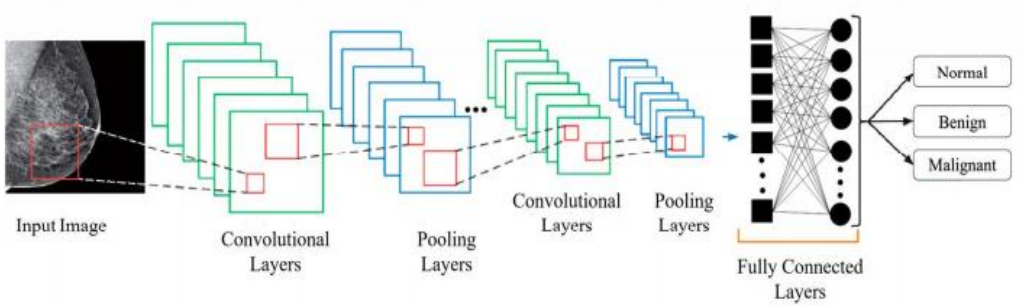

Fig. 2.Algorithim used in system

IV. CONCLUSION

In summary, there is great promise for improving early diagnosis and treatment of this common disease through the creation and application of a breast cancer detection system. Such a system can greatly improve the precision, effectiveness, and accessibility of breast cancer screening by utilising cutting-edge technologies including medical imaging methods, artificial intelligence, and machine learning algorithms.

V. RESULTS

Systems for detecting breast cancer have the potential to lower the number of needless biopsies and false positives. Conventional screening techniques may produce false alarms, causing patients to undergo needless medical treatments and distress. These systems can more effectively identify between benign and malignant anomalies by using machine learning algorithms to analyse complicated datasets. This helps to lower the number of false positive outcomes and needless

actions. The deployment of breast cancer detection systems may also enhance the distribution of healthcare resources. Healthcare practitioners can optimise resource utilisation and provide timely and adequate care for the most vulnerable patients by giving priority to high-risk clients for additional examination and intervention. Overall, breast cancer detection system results show considerable advancements in early detection

REFERENCES

[1]. Al-masni, M.A., Al-Antari, M.A., Park, J.M., Gi, G., Han, S.M., Kim, T.S., Rivera, P., Valarezo, E., Choi, M.T., Kim, H.T. and Kim, T.S., 2017. Breast cancer detection using deep convolutional neural networks and support vector machines. Journal of Medical Imaging and Health Informatics, 7(6), pp.1234-1238.

[2]. Dandapat, S., Maheshwari, A., Verma, H., Singh, A., &Dandapat, S. (2020). A comparative analysis of machine learning algorithms for breast cancer detection using mammographic dataset. IEEE Access, 8, 137124-137133.

[3]. Dhahri, H., & Ben Ayed, S. (2018). Breast cancer detection based on extreme learning machine approach. In 2018 2nd International Conference on Bio-engineering for Smart Technologies (BioSMART) (pp. 1-6). IEEE.

[4]. Hamidinekoo, A., Denton, E., Rampun, A., Honnor, K., Zwiggelaar, R., & Diaz, O. (2018). Breast cancer histopathology image analysis: A review. In 2018 IEEE 15th International Symposium on Biomedical Imaging (ISBI 2018) (pp. 502-506). IEEE.

[5]. Khalid, S., Afzal, M., Haider, M.A., Khan, S.A., &Jameel, R. (2019). Computer-aided breast cancer detection using deep learning. In 2019 IEEE 6th International Conference on Engineering Technologies and Applied Sciences (ICETAS) (pp. 1-6). IEEE.