IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, April 2023
Impact Factor: 7.301

A Deep Learning Model for Detection Cancer in Breast

Sruthi Thirunagari[1], Veeramalla Nikitha[2], Jasti Padmavathi[3], Anuradha Reddy[4], Mamatha Kurra[5]
Assistant Professor, Department of Computer Science and Engineering[2,3,4,5]
Assistant Professor, Department of Computer Science and Engineering(DS)[1]
Malla Reddy Institute of Technology & Science, Maisammaguda, Dhulapally, Secunderabad
anuradhareddy.anu@gmail.com

Abstract: *It is exceedingly difficult to identify and classify breast cancer. In reality, a tumor or cancer is a complicated process that involves several changes to the mammography images. Additionally, distinct tissues are used to describe various sections of the image that exhibit variable and high appearance. The primary advantage of this method is image classification for cancer prediction and performance improvement. On an open-source dataset, we trained and tested the application of our research. Python 3 will be used to create this project. The Jupiter IDE will be used to deploy the project. The overall goal of this project is to provide the highest level of performance and efficiency.*

Keywords: Cancer, Tumor, Image Processing, Deep Learning, HOG, CNN

I. INTRODUCTION

Cancer, which primarily affects women, has become one of the most serious and deadly diseases in the world, as we are all aware [1,2]. Therefore, using deep learning techniques to diagnose cancer in patients, particularly women, is our main goal [3].When aberrant cells in the affected body part start to grow uncontrollably, cancer or tumor development in the breast or any other body part begins. The primary risk factors for breast cancer can be categorized as a mix of genetic and environmental variables [4,5,6,7]. The only elements that cannot be changed or controlled are those that are genetic, such as family history. The primary contributions we make to this process are picture categorization, tumor prediction, and performance and analysis improvisation [8,9]. Additionally, distinct tissues are used to describe various sections of the image that exhibit variable and high appearance. Image processing is the term used to describe the technique used to extract information and produce improved images [10, 11, 12]. Here, signal processing has been applied to transform an input image into the desired output image [13, 14, 15]. Image processing is one of the fastest expanding technologies used in computer science, engineering, and research today.

Basically, image processing involves the following three steps:

1. Uploading the picture using image-acquisition software
2. Examine and modify the image
3. The output, which is nothing more than the transformed image, is the outcome

II. LITERATURE SURVEY

A approach where the two models of deep learning technique are compared with the breast cancer detection system was proposed in the paper "Breast Cancer Detection Based on Deep Learning Technique." They employed techniques such as pre-processing, categorization, and performance evaluation. VGG16 and ResNet50 are the two models that are most frequently employed in this study to distinguish between aberrant tumours and normal tumours using the IRMA dataset. ResNet50 produced an accuracy of 91.7% when compared to VGG16, which provided a result that was closer to 94%. The unprocessed, scaled photos from the image retrieval for medical applications (IRMA) datasets are then transformed to fit the network architecture [16].

In the paper "Breast Cancer Detection From Histopathological Images Using Deep Learning," the MIAS dataset, which is available for the diagnosis of breast cancer, is used. The additional techniques employed in this case included neural language processing, image preprocessing, and patient diagnosis. The paper was primarily separated into three sections:

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, April 2023
Impact Factor: 7.301

dataset collecting, preprocessing algorithm application, and dataset scaling and filtering followed by splitting the dataset into training and testing portions. The results were then represented using a data graph. As a result, it is clear that the MIS dataset is the only one where the deep learning technique employed to diagnose cancer is effective. The breast cancer and diagnosis features in this dataset total 12. The suggested deep learning algorithm and other machine learning models were also contrasted in the paper [17].

The article "Research on the Breast Cancer Detection Method" Deep Convolutional Neural Network Based on Computer Aid" employs the Convolutional Neural Network technique for both method identification and image classification. The accuracy of their method was found to be around 89%, and as a result, the accuracy of the classification of images of breast cancer is significantly improved when compared with traditional methods. Here, Convolutional Neural Networks with different structures were pre-trained before being used to automatically extract the characteristic features and also fuse the extracted features from the two structures. They concentrated on modifying the CNN structure's impact so that they could incorporate different types of information for categorization performance [18].

The self-supervised learning method was utilized in the paper "Self-Supervised Learning for Detection of Breast Cancer in Surgical Margins with Limited Data" to enhance the accuracy of tumour detection at surgical margins. The model creates new instances by splitting the picture spectrum into smaller chunks and randomly rearranging their order. By studying the patch order and examining the shuffled data, the properties of the model are captured. The weights are then adjusted for cancer detection. On the REIMS dataset, the self-supervised model is used. A sample of 144 cancer data. The classification of the malignancy as malignant or benign is then based on these characteristics [19].

In the paper "Breast Cancer Malignancy Prediction Using Deep Learning Neural Networks," the goal is to use deep neural networks to predict the breast cancer's malignancy. This study makes use of the Wisconsin breast cancer dataset. A F1 score of over 98 is acquired when the overfitting of the neural networks model is optimized to move forward with the early halting mechanism; if the cancer is benign, the value indicated is zero, and if it is malignant, the value shown is one. Since the machine in the deep learning process tries to imitate or reproduce human behaviour. It is therefore utilized in computer assisted diagnosis [20].

III. PROPOSED SOLUTION

The patient dataset and the data warehouse's archived reports are used to implement the model. The Deep Learning model used for analysis and evaluation can assist in accurately identifying more subtle patterns [21,22]. By doing this, we will be able to create an ideal threshold and thus increase the accuracy for future diagnosis help. In order to extract some relevant elements and create an improved image, we have also used image processing, which can be used to conduct a variety of operations on the image [23,24]. When the input and the output are both images, a technique known as signal processing is performed. The output may additionally include of attributes or properties related to that specific image [25,26,27]. As is well known, image processing serves as the foundation for numerous computer science and engineering research fields.

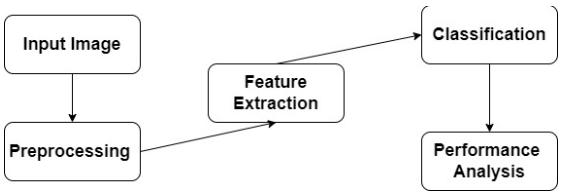

Fig 1. The overall breast cancer detection system is shown in the architecture diagram

3.1 Preprocessing of Images

1. To fit the images into the input layer's network, a resizing operation is carried out. The photos should be 224 by 224 in size. The photographs are therefore scaled to this specific format for a uniform size.
2. The greyscale photos are then transformed to RGB images so they can be fed into the three channel input, and finally the mammography images are converted into a three channel input image.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, April 2023
Impact Factor: 7.301

3.2 Applied Models

Convolutional neural networks are the primary model utilized (CNN). Convolutional neural networks are used in many applications, including image identification and computer vision (CNN)[28,29]. As a result, it is one of the models that are frequently utilized. This concept is used in fields like picture categorization and recognition [30,31,32]. The input layer, several hidden layers, and one output layer make up the CNN. The convolutional layer and the pooling layer are the two crucial layers in CNN. Since the pooling layers frequently appear between the convolutional layers, they can be leveraged to do data subsampling in order to lower training overheads.

The HOG descriptor, also known as the Histogram of Oriented Gradients descriptor, is used to extract features from the image data. Let's examine some of the key benefits of HOG that set it apart from other feature descriptors. HOG places more emphasis on the shape of the object than simply determining if a pixel is an edge [33,34]. By dividing the gradients into smaller regions, the orientation and gradients are calculated for each of the regions, and then a histogram is generated for each of these regions separately, HOG can be used to determine the direction of the edge as well. This method is known as "Histogram of Oriented Gradients."

3.3 A Few Applied Procedures

1. Acquisition of Images
2. Image Preprocessing
3. Component Extraction
4. Group the Images
5. Examining the Results

IV. CONCLUSION

It makes sense to use deep learning to create a breast cancer detection system that is effective. The model can predict outcomes with an accuracy that ranges from 85% to 95% based on training and testing datasets. Our primary models included CNN (Convolutional Neural Networks) and HOG (Histogram of Oriented Gradients). Convolutional Neural Networks (CNN/ConvNet) are deep neural networks that are most frequently employed in deep learning to interpret visual imagery. The cancer detection system that we proposed, which mostly used the CNN algorithm, was shown to be able to reliably and effectively display the results after extensive analysis, comparison, and prediction.

REFERENCES

[1]. Ghantasala, G. P., Reddy, A., Peyyala, S., & Rao, D. N. (2021). Breast Cancer Prediction In Virtue Of Big Data Analytics. *INTERNATIONAL JOURNAL OF EDUCATION, SOCIAL SCIENCES AND LINGUISTICS*, *1*(1), 130-136.

[2]. Ghantasala, G. P., Kumari, N. V., &Patan, R. (2021). Cancer prediction and diagnosis hinged on HCML in IOMT environment. In *Machine Learning and the Internet of Medical Things in Healthcare* (pp. 179-207). Academic Press.

[3]. Ghantasala, G. P., Reddy, A. R., &Ayyappa, R. M. K. (2022). Protecting Patient Data with 2F-Authentication. *Cognitive Intelligence and Big Data in Healthcare*, 169.

[4]. G S PradeepGhantasala, D. NageswaraRao, Mandal K (2021) MACHINE LEARNING ALGORITHMS BASED BREAST CANCER PREDICTION MODEL. *Journal of Cardiovascular Disease Research*, 12 (4), 50-56. doi:10.31838/jcdr.2021.12.04.04

[5]. Ghantasala, G. P., &Kumari, N. V. (2021). Breast Cancer Treatment Using Automated Robot Support Technology ForMri Breast Biopsy. *INTERNATIONAL JOURNAL OF EDUCATION, SOCIAL SCIENCES AND LINGUISTICS*, *1*(2), 235-242.

[6]. Ghantasala, G. P., Kallam, S., Kumari, N. V., &Patan, R. (2020, March). Texture Recognization and Image Smoothing for Microcalcification and Mass Detection in Abnormal Region. In *2020 International Conference on Computer Science, Engineering and Applications (ICCSEA)* (pp. 1-6). IEEE.

[7]. Bhowmik, C., Ghantasala, G. P., &AnuRadha, R. (2021). A Comparison of Various Data Mining Algorithms to Distinguish Mammogram Calcification Using Computer-Aided Testing Tools. In *Proceedings of the Second International Conference on Information Management and Machine Intelligence* (pp. 537-546). Springer, Singapore.

[8]. Sreehari, E., &Ghantasala, P. G. (2019). Climate Changes Prediction Using Simple Linear Regression. *Journal of Computational and Theoretical Nanoscience*, *16*(2), 655-658.

[9]. Kishore, D. R., Syeda, N., Suneetha, D., Kumari, C. S., &Ghantasala, G. P. (2021). Multi Scale Image Fusion through Laplacian Pyramid and Deep Learning on Thermal Images. *Annals of the Romanian Society for Cell Biology*, 3728-3734.

[10]. G. S. PradeepGhantasala, NalliVinayaKumari. Mammographic CADe and CADx for Identifying Microcalcification Using Support Vector Machine. Journal of Communication Engineering & Systems. 2020; 10(2): 9–16p.

[11]. Kumari, N. V., &Ghantasala, G. P. (2020). Support Vector Machine Based Supervised Machine Learning Algorithm for Finding ROC and LDA Region. *Journal of Operating Systems Development & Trends*, *7*(1), 26-33.

[12]. Ghantasala, G. P., Tanuja, B., Teja, G. S., &Abhilash, A. S. (2020). Feature Extraction and Evaluation of Colon Cancer using PCA, LDA and Gene Expression. *Forest*, *10*(98), 99.

[13]. Ghantasala, G. P., &Kumari, N. V. (2021). Identification of Normal and Abnormal Mammographic Images Using Deep Neural Network. *Asian Journal For Convergence In Technology (AJCT)*, *7*(1), 71-74.

[14]. "A survey on Microcalcification identification and classification using CAD System", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.2, Issue 5, page no.186-190, MAY-2015, Available :http://www.jetir.org/papers/JETIR1805783.pdf

[15]. G S PradeepGhantasala et al., International Journal of Research in Engineering, IT and Social Sciences, ISSN 2250-0588, Impact Factor: 6.452, Volume 06 Issue 09, September 2016, Page 50-54

[16]. Ismail, N. S., &Sovuthy, C. (2019, August). Breast cancer detection based on deep learning technique. In *2019 International UNIMAS STEM 12th engineering conference (EnCon)* (pp. 89-92). IEEE.

[17]. Khuriwal, N., & Mishra, N. (2018, November). Breast cancer detection from histopathological images using deep learning. In *2018 3rd international conference and workshops on recent advances and innovations in engineering (ICRAIE)* (pp. 1-4). IEEE.

[18]. Ragab, D. A., Sharkas, M., Marshall, S., & Ren, J. (2019). Breast cancer detection using deep convolutional neural networks and support vector machines. *PeerJ*, *7*, e6201.

[19]. Santilli, A. M., Jamzad, A., Sedghi, A., Kaufmann, M., Merchant, S., Engel, J., ...& Mousavi, P. (2021, April). Self-supervised learning for detection of breast cancer in surgical margins with limited data. In *2021 IEEE 18th International Symposium on Biomedical Imaging (ISBI)* (pp. 980-984). IEEE.

[20]. Prakash, S. S., &Visakha, K. (2020, July). Breast cancer malignancy prediction using deep learning neural networks. In *2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA)* (pp. 88-92). IEEE.

[21]. Krishna, N. M., Sekaran, K., Vamsi, A. V. N., Ghantasala, G. P., Chandana, P., Kadry, S., ... &Damaševičius, R. (2019). An efficient mixture model approach in brain-machine interface systems for extracting the psychological status of mentally impaired persons using EEG signals. *IEEE Access*, *7*, 77905-77914.

[22]. Patan, R., Ghantasala, G. P., Sekaran, R., Gupta, D., & Ramachandran, M. (2020). Smart healthcare and quality of service in IoT using grey filter convolutional based cyber physical system. *Sustainable Cities and Society*, *59*, 102141.

[23]. Rupa, C., MidhunChakkarvarthy, D., Patan, R., Prakash, A. B., & Pradeep, G. G. (2022). Knowledge engineering–based DApp using blockchain technology for protract medical certificates privacy. *IET Communications*.

[24]. Reddy, A. R., Ghantasala, G. P., Patan, R., Manikandan, R., &Kallam, S. Smart Assistance of Elderly Individuals in Emergency Situations at Home. *Internet of Medical Things: Remote Healthcare Systems and Applications*, 95.

[25]. Kishore, D. R., Suneetha, D., Ghantasala, G. P., &Sankar, B. R. Anomaly Detection in Real-Time Videos Using Match Subspace System and Deep Belief Networks. *Multimedia Computing Systems and Virtual Reality*, 151.

[26]. Ghantasala, G. P., Reddy, A. R., &Arvindhan, M. Prediction of Coronavirus (COVID-19) Disease Health Monitoring with Clinical Support System and Its Objectives. In *Machine Learning and Analytics in Healthcare Systems* (pp. 237-260). CRC Press.

[27]. Kongala, L., Shilpa, T., Reddy Madhavi, K., Ghantasala, P., &Kallam, S. (2023). Applying Machine Learning to Enhance COVID-19 Prediction and Diagnosis of COVID-19 Treatment Using Convalescent Plasma. In *Intelligent Computing and Applications* (pp. 479-489). Springer, Singapore.

[28]. Chandana, P., Ghantasala, G. P., Jeny, J. R. V., Sekaran, K., Deepika, N., Nam, Y., &Kadry, S. (2020). An effective identification of crop diseases using faster region based convolutional neural network and expert systems. *International Journal of Electrical and Computer Engineering (IJECE)*, *10*(6), 6531-6540.

[29]. MANDAL, K., GHANTASALA, G. P., KHAN, F., SATHIYARAJ, R., & BALAMURUGAN, B. (2020). Futurity of Translation Algorithms for Neural Machine Translation (NMT) and Its Vision. *Natural Language Processing in Artificial Intelligence*, 53.

[30]. Ghantasala, G. P., Sudha, L. R., Priya, T. V., Deepan, P., &Vignesh, R. R. An Efficient Deep Learning Framework for Multimedia Big Data Analytics. *Multimedia Computing Systems and Virtual Reality*, 99.

[31]. Gadde, S.S., Anand, D., SasidharBabu, N., Pujitha, B.V., SaiReethi, M., PradeepGhantasala, G.S. (2022). Performance Prediction of Students Using Machine Learning Algorithms. In: Deepak, B.B.V.L., Parhi, D., Biswal, B., Jena, P.C. (eds) Applications of Computational Methods in Manufacturing and Product Design. Lecture Notes in Mechanical Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-19-0296-3_36

[32]. PradeepGhantasala, G.S., NageswaraRao, D., Patan, R. (2022). Recognition of Dubious Tissue by Using Supervised Machine Learning Strategy. In: Deepak, B.B.V.L., Parhi, D., Biswal, B., Jena, P.C. (eds) Applications of Computational Methods in Manufacturing and Product Design. Lecture Notes in Mechanical Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-19-0296-3_35

[33]. Mandal, K., &Ghantasala, G. P. (2019). A complete survey on technological challenges of iot in security and privacy. *Int. J. Recent Technol. Eng.*, *7*(6S4), 332-334.

[34]. D. N. Malleswari, D. N. Rao, P. Vidyullatha, G. S. P. Ghantasala, R. Sathiyaraj and Yogesh, "Enhanced SS-FIM Algorithm For High Utility Uncertain Itemsets," *2022 IEEE 2nd International Conference on Mobile Networks and Wireless Communications (ICMNWC)*, Tumkur, Karnataka, India, 2022, pp. 1-5, doi: 10.1109/ICMNWC56175.2022.10031871.