**Bulletin of Environment, Pharmacology and Life Sciences**
Bull. Env. Pharmacol. Life Sci., Vol 11 [6] May2022 : 89-93
©2022 Academy for Environment and Life Sciences, India
Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD

**REVIEW ARTICLE** **OPEN ACCESS**

# Deep learning application for early diagnosis of cancer

**G K Jakir Hussain[1], Sai Krishna Kodali[2], Mohd Ashaq[3], Ayesha Taranum[4],Jose Moses Gummadi[5],**
**1.**Assistant Professor (Selection Grade), Department of Electronics and Communication Engineering, KPR Institute of Engineering and Technology, Coimbatore, Tamilnadu 641407, India.
**2.**Assistant Professor, Department of ECE, Anurag University,Hyderabad-500088.
**3.**Sr. Assistant Professor,Department of Botany,Govt. PG College Rajouri, J&K -185133.
**4.**AssistantProfessor,Department of Mathematics, Anwarul Uloom College,Hyderabad, Telangana 500 001.
**5.**Professor & HOD CSE(Cyber Security),Malla Reddy Engineering College (A), Hyderabad.
**Corresponding e-mail:**gkjakirhussain@gmail.com

**ABSTRACT**
*The growth of Artificial Intelligence technology has resulted in the improvisation of the healthcare industry, especially in the early diagnosis of diseases. In this research, we are going to study the early diagnosis of cancer using deep learning applications. The early diagnosis of cancer is an important process in the treatment of cancer. It is essential to diagnose earlier the case of cancer for successful results. In the case of delay, the cancer cells spread rapidly and the survival chances are less. Thus the early diagnosis of cancer is very much essential. The proposed methodology employs Deep CNN termed Colposcopy Ensemble Network (CYENET) for Image classification which enhances cancer treatment and supports the early diagnosis.*
**Keywords:** Early Diagnosis, Cancer Diagnosis, Deep Learning (DL), Colposcopy Ensemble Network (CYENET).
*
Received: 18.02.2022 Revised: 17.03.2022 Accepted: 21.03.2022

## INTRODUCTION

Cancer is a broad word for a set of disorders in which abnormal cells proliferate uncontrollably in any organ or tissue of the body. This process has expanded to other organs and has gone beyond the level. Cancer is sometimes referred to as a neoplasm or a malignant tumour. Cancer cells can spread throughout the body. The authors of [1] discussed the pre-processing process and stated that it can improve the overall performance of the algorithm. Besides the regular purpose of an algorithm such as segmentation, classification, and detection the pre-processing phase is also considered an important process. The pre-processing processes involved in the CT scan and MRI are also discussed. This study has investigated the proposed pre-processing steps for the CT scan images and MRI images of patients affected by prostate cancer. The authors of [2] reviewed a Computer-Aided Diagnosis (CAD) system to diagnose breast cancer. The proposed CAD system utilizes deep learning (DL) techniques for this purpose. They have also discussed some of the issues and research gaps in this regard. Based on the research gap, they suggested that constant research should be done both on literature and scientific means.

In [3], the researchers provided details on the deployment of machine learning (ML) in Prostrate MRI. They have concluded that their results were efficient and promising and also suggested the need for more validation of this technology before clinical application. The authors of [4] has reviewed the applications of Deep Learning (DL) and Machine Learning (ML) techniques in Urology. They have concluded that the proposed system is efficient overall and also enhances individualized healthcare. Deep Learning (DL) technology in the classification of cancer, its advantages and disadvantages [5]. Amara's law has been stated and discussed on how DL changes the diagnostic methods. They have concluded by saying that Cancer imaging done by DL technology needs more validation in assisting pathologists.

A study that reviews the applications of Deep Learning (DL) models in the healthcare industry is specified in [6]. The most commonly used DL models, their advantages and disadvantages have been discussed. The DL models are used in Image Processing in the diagnosis of many diseases. Tasks such as classification, segmentation, and prediction are done with the help of these models. They have concluded the review that the limitations have to be removed and further improvisation is needed in utilizing the DL models. In [7], the development of a Computer-Aided Diagnosis (CAD) system to do classification work by differentiating cancer cells from normal cells is discussed. For this purpose, they have designed a DL

Image analysis model and done a test to obtain results from the same. Processing large amounts of data, high accuracy rates, less human intervention are the results obtained in their tests.

At early diagnosis of skin cancer by performing classification of images is given in [8]. The images are classified as benign or malignant. By examining the results, they have achieved accuracy rates of 84.09% and 87.42% by deploying ResNet-101 architecture and Inception-v3 architecture respectively DL technology in molecular imaging of tumour lesions segmentation is given in [9]. It is also deployed to do survival prediction and classification tasks. They have provided future directions for the researchers to improve the DL technique in cancer molecular imaging. A transfer learning procedure in the classification of cancer is provided in [10]. Unsupervised data is used to achieve improvised results. The DL molecular disease classification is used in the diagnosis.

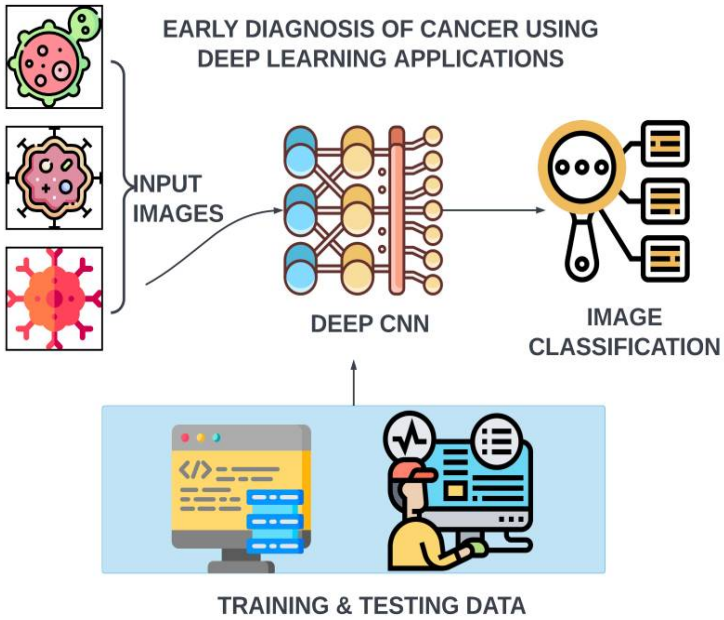


**Figure 1: Early Diagnosis of Cancer**

**MATERIAL AND METHODS**

The proposed methodology (Ref. Figure 1) utilizes the Deep Learning CNN algorithm for image classification. The training and testing of the Deep CNN are done with the help of the cancer image data. Convolutional Neural Network (CNN) is a type of deep neural network for analyzing visual images. Convolution is the key technique used in it. Convolution is a mathematical function that takes two functions and produces a third function that shows how the form of one is affected by the shape of the other. Learning from the ground up CNN relies on images to make predictions. The Input images are given to the system for classification. DeepCNN classifies the images by comparing them with the cancer images in the dataset that it has been trained. The proposed system has been found very efficient in the classification of cancer images. Further validation this technology is needed for implementation in the healthcare industry.

Traditional breast cancer screening is less accurate and primarily reliant on the pathologist's expertise. Colposcopy is an essential element of cervical cancer prevention. Over the last 50 years, laparoscopic surgery, combined with integrated pre-cancer screening and therapy, has proven crucial in decreasing ovarian cancer incidence fatality rates. On the other hand, visual screening leads to misdiagnosis and poor diagnostic efficiency due to the increased effort. Medical image processing utilizing the Convolutional Neural Network (CNN) architecture indicates excellence for cervical cancer classification in machine learning. The VGG19 (TL) and CYENET model are presented in this study as CNN architectures for identifying cervical cancer. VGG19 was employed as a learning algorithm in the CNN architecture for the research. A novel model dubbed the Colposcopy Ensemble Network (CYENET) is being developed for automatic classification of cervical cancers. VGG19's classification performance was fulfilled, and VGG19's results were acquired (TL). A VGG19 model's sigma score shows that it belongs to the intermediate classification category.

The underlying rule for diagrammatical transformation matrices, and the technique for attempting to build interlocking pictures, is addressed briefly below Equation (1).

When it comes to the transformation matrix,

$$\begin{cases} n' = sn + dm + k \\ m' = \quad n + um + k \end{cases} \qquad (1)$$

It could be expressed as a standard 3 × 3 graphical approach, as shown by Equation (2).

$$[n', m', 1] = [n, m, 1].\begin{bmatrix} s & h & 0 \\ d & u & 0 \\ 0 & y & 1 \end{bmatrix} \qquad (2)$$

The three most important fundamental implements are as follows: Equation (3).
(1) Translation transition

$$\left[n^{'}, m^{'}, 1\right] = [n, m, 1].\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ n_v^{'} - n_v & m_v^{'} - m_v & 1 \end{bmatrix} \qquad (3)$$

$(n_v, m_v))$ and$n_v^{'}, m_v^{'}$ are the points of reference of every defined location between translations in both. Equation (11) converts the /e interpretation to the $Z$ convolution.
(2) Proportional transformation

$$\left[n^{'}, m^{'}, 1\right] = [n, m, 1].\begin{bmatrix} g_n & 0 & 0 \\ 0 & g_m & 0 \\ 0 & 0 & 1 \end{bmatrix} \qquad (4)$$

(3) Rotation transformation concentrated here on addressability via Equation (5):

$$\left[n^{'}, m^{'}, 1\right] = [n, m, 1].\begin{bmatrix} \cos\vartheta & -\sin\vartheta & 0 \\ \cos\vartheta & \cos\vartheta & 0 \\ 0 & 0 & 1 \end{bmatrix} \qquad (5)$$

When a value is $\vartheta > 0$, it indicates that perhaps the formation is rotated.

**RESULTS AND DISCUSSIONS**

The transformation function of the system may be executed, and the results obtained by applying the three basic transformation indicated in the preceding section. The device of such a fundamental transformation matrix is also used to define the modified sequence matrix.Deep learning has made tremendous progress in a variety of areas, including machine learning, language processing, prediction, including battery health monitoring. Classification, recognition, segment, and registration of medical images are all important in illness diagnosis. The great bulk of image data processed is comprised of medical images of different categories. Deep learning is a multilayer neural network that learns more abstract elements in images and also is predicted to resolve problems plaguing traditional medical systems.

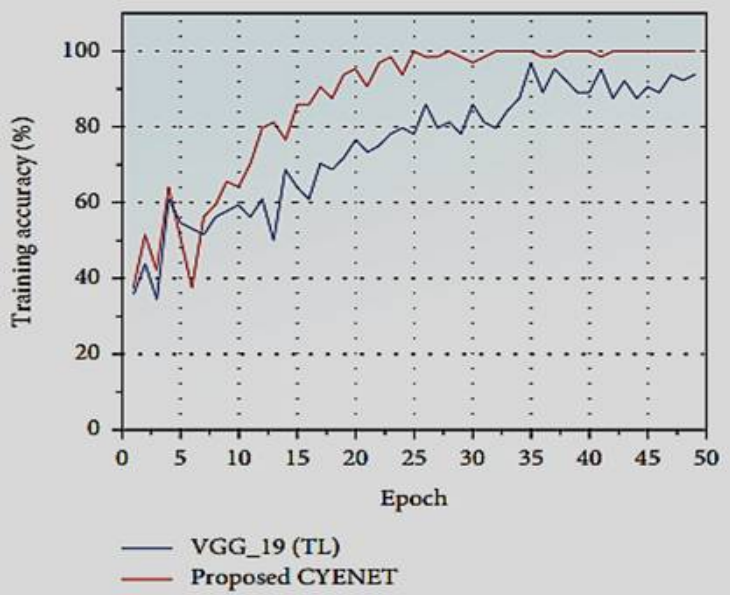


**Figure 2: Plot of validation accuracy of VGG19 and CYENET models**

Colposcopy is a surgical technique that is commonly used to detect cervical cancer. Early discovery and categorization of cancer might significantly impact the patient's overall clinical management. Several studies have employed digital colposcopy to extract characteristics from pictures in various ways (Figure 2). The fundamental purpose of this research is to provide appropriate tools for health practitioners to employ during colposcopy exams, regardless of their skill level. Previous computer-aided diagnosis studies have been designed for various tasks, including image quality improvement and evaluation, regional segmentation, photograph identification, identifiers of unstable countries and patterns, interfacial transition type classification category, and heart disease risk classification.

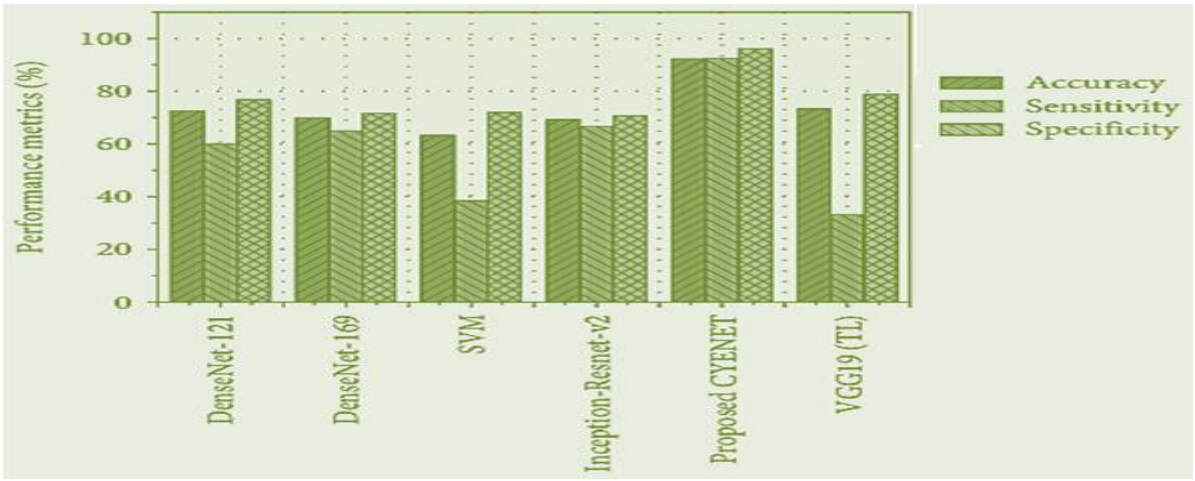


**Figure 3: System performance metrics comparison**

CNN models have been widely employed in various computer vision applications, including medical picture segmentation. However, using colposcopy images to detect ovarian cancer is an apparent computer vision difficulty. The neural network, specifically CNN, is used in different circumstances when comparing deep learning to classical features. The test employs a deep learning algorithm (Figure 3). The recommended VGG 19 model is outstanding to classify three testicular cancer classes and tested using a cervical imaging dataset by freezing the top layers. This research proposed the CYENET architecture, which combines the essential benefits of depth with parallel convolutional filters to increase the extraction of particular testicular cancer characteristics using colposcopy images.

## CONCLUSION

Breast cancer detection and classification is one of the most important applications in the medical industry. The World Health Organization provides detailed reports showing that breast cancer affects 59% of women. It is also one of the main reasons for the sudden death of women. Therefore, the entire medical industry is activating medical professionals to develop new ways to diagnose, detect, and identify breast cancer from mammographic images. The various previous methods used traditional methods, but they lack accuracy because they do not focus on image enhancement. Some methods do not allow you to fully learn the big picture. Therefore, the classification accuracy is not high. Therefore, the industry needs a better way to provide accurate breast imaging and accurately predict grades. In this article, we used the Colposcopy Ensemble Network (CYENET) to thoroughly study images and extract, analyze, and classify many features. The input image is denoised and enhanced before being sent to the Colposcopy Ensemble Network (CYENET). Therefore, the accuracy of classification is high compared to other existing methods. The proposed CYENET is programmed with MATLAB software and the results obtained are provided for accuracy verification.

## ACKNOWLEGEMENT

The authors acknowledge the subjects who were involved in the study.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest for this study

## REFERENCES:

1. Masoudi, Samira, et al. (2021). "Quick guide on radiology image pre-processing for deep learning applications in prostate cancer research." *Journal of Medical Imaging* 8.1: 010901.
2. Ezhilarasi, T. P., Sudheer Kumar, N., Latchoumi, T. P., &Balayesu, N. (2021). A secure data sharing using IDSS CP-ABE in cloud storage. In Advances in Industrial Automation and Smart Manufacturing (pp. 1073-1085). Springer, Singapore.
3. Latchoumi, T. P., & Parthiban, L. (2021). Quasi oppositional dragonfly algorithm for load balancing in cloud computing environment. Wireless Personal Communications, 1-18.
4. Latchoumi, T. P., Swathi, R., Vidyasri, P., & Balamurugan, K. (2022). Develop New Algorithm To Improve Safety On WMSN In Health Disease Monitoring. In 2022 International Mobile and Embedded Technology Conference (MECON) (pp. 357-362). IEEE.
5. Pavan, V. M., Balamurugan, K., &Latchoumi, T. P. (2021). PLA-Cu reinforced composite filament: Preparation and flexural property printed at different machining conditions. Advanced composite materials.

6. Bhatt, Chandradeep, et al. (2021). "The state of the art of deep learning models in medical science and their challenges." *Multimedia Systems* 27.4: 599-613.
7. Latchoumi, T. P., Balamurugan, K., Dinesh, K., &Ezhilarasi, T. P. (2019). Particle swarm optimization approach for waterjet cavitation peening. *Measurement*, *141*, 184-189
8. Latchoumi, T. P., Kalusuraman, G., Banu, J. F., Yookesh, T. L., Ezhilarasi, T. P., & Balamurugan, K. (2021). Enhancement in manufacturing systems using Grey-Fuzzy and LK-SVM approach. In 2021 IEEE International Conference on Intelligent Systems, Smart and Green Technologies (ICISSGT) (pp. 72-78). IEEE.
9. Garikapati, P., Balamurugan, K., Latchoumi, T. P., &Malkapuram, R. (2021). A Cluster-Profile Comparative Study on Machining AlSi7/63% of SiC Hybrid Composite Using Agglomerative Hierarchical Clustering and K-Means. *Silicon*, *13*(4), 961-972.
10. Sevakula, Rahul K., et al. (2018). "Transfer learning for molecular cancer classification using deep neural networks." *IEEE/ACM transactions on computational biology and bioinformatics* 16.6: 2089-2100.

**CITATION OF THIS ARTICLE**

G K Jakir Hussain, Sai Krishna Kodali, MohdAshaq, Ayesha Taranum, Jose Moses Gummadi, .Deep learning application for early diagnosis of cancer. Bull. Env. Pharmacol. Life Sci., Vol 11[6]May 2022:89-93