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A Review of Deep learning in Medical Diagnosis

Rachna Kumari[1], Amita Verma[2], Sunita[3]
[1, 2, 3]*Department of Computer Science & Engineering, Guru Jambheshwar University of Science & Technology, Hisar, India*

Abstract: Medical diagnosis is a process of determining which disease a person's symptoms and signs indicate. It is a diagnosing procedure that classifies an individual's condition into distinct categories that helps in making medical decision about treatment. This paper described deep learning technique use in medical diagnosis field.

I. INTRODUCTION

Medical diagnosis is a process of determining which disease a person's symptoms and signs indicate. It is a diagnosing procedure that classifies an individual's condition into distinct categories that helps in making medical decision about treatment [1] [2].

A. Detection of lung nodules on chest X-rays and CT scans, and colonic polyps on CT colonography.
B. Diagnosis diseases such as breast, cervical, and prostate cancers.
C. Image classification of CT and MRI scans and chest X-rays.
D. Blood vessel detection in ultrasound images.

First section of this paper gives introduction to medical field. Then in second section of the paper described deep learning in medical diagnosis field. Third section discussed literature review and fourth section described conclusion and future scope of paper. Then last section contain references.

II. DEEP LEARNING IN BIOINFORMATICS AND MEDICAL DIAGNOSIS

Now a day's deep learning is used in more and more domains and provides encouraging results in almost all the areas. The success of deep learning in the domain of image recognition, natural language processing and computer vision lead to its use in health and medical fields.

Automatic feature extraction capability of deep learning plays a vital role in most emerging fields such as bioinformatics and medical diagnosis for analyzing, visualization and manipulation of biological data. For example in medical imaging, deep learning techniques are used to extract the feature that is very difficult and complex by using descriptive means. Deep learning is successfully used for classification of tissue and cell classification and also widely used for diagnosing diseases such as cancer, tumour and diabetes etc. [3].

III. LITERATURE REVIEW

M. Sertkay *et al.* [4] diagnosis some diseases in the retina of the eye by using CNN deep learning model. They examined Optical Coherence Tomography device from Choroidal Neovascularization, Diabetic Macular Edema, Drusen and healthy eye retinal images using LeNet, AlexNet and Vgg16 architectures. In implementation only the hyper parameters were changed to diagnose these diseases. After implementation it was found that Vgg16 and AlexNet architecture provides better result. Dropout layer in AlexNet architecture was unused to reduce loss by minimizing error. In the future studies, deep learning techniques can be used to determine the deformed region by removing the heat map.

U. Niyaz *et al.* [5] provided a review of deep learning techniques in the field of medical image processing and analysis such as X-Rays, CT Scans and MRIs. They had applied new deep learning architectures for predicting the different types of cancer like the brain, lung, skin, etc. For analysing medical images ResNet, GoogLeNet or VGG are used. They applied Capsule Network (CapsNet) to make the classification and detection comparatively better by assembling CNN model of deep learning. In future studies the extraordinary capabilities of CapsNet make the diagnosis and detection more accurate and faster.

Catarina Barata and J. Marques [6] deep-learning architecture was used to hierarchical diagnosis for skin lesion. Skin lesions are organized in a hierarchical way, for diagnosing diseases. For image analysis and classification Convolutional Neural Network model of deep learning is used. They also performed the comparative study on the importance of lesion segmentation, color normalization, and evaluation metrics. Result show color normalization improves the performance. For future work we can validate these results on a larger datasets that comprises more classes of lesions.

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P. Gupta and A.Malhi [7] applied the deep learning framework for analyzing CT scan images for detecting head and neck cancer. First CT scan images were provided as input to the system and processed through weiner filter. Then process the image through the segmentation technique called fuzzy c means algorithm. Gray Level Co-Occurrence Matrix (GLCM) was used to extract the features. These features were provided to classifier to train the model. This model provided satisfactory results. In future this technique can be applied to detect lung cancer, breast cancer etc.

W. H. Chang *et al*. [8] a deep learning model is built through a large number of tongue images, especially for tongue fissures. They applied Grad-CAM on Res-Net and try to visualize tongue fissure regions. The results obtained through these models are not accurate enough. Further parameters are adjusted to find better result. And this technique can be combined to another deep learning technique for accurate results.

P. Khatamino *et al*. [9] proposed Convolutional Neural Network (CNN) for learning features from Handwriting drawing spirals. These spirals help in identifying patients with Parkinson. The performance of model was evaluated through K- Fold cross validation and Leave-one-out cross validation (LOOCV) techniques. They used Dynamic Spiral Test and traditional Static Spiral Test for Parkinson disease diagnosis. CNN model achieved high accuracy by using few features of the Parkinson disease dataset. Classification results also give high accuracy in DST (dynamic spiral test) analysis section. For future works, different Deep Learning CNN architecture like LeNet or ImageNet on dataset for more accuracy can be implemented. CNN classifier can also be applied for analysing dataset signals.

Xia Sun, Long Ma [10] presented a deep convolutional neural network for Drug Drug interaction extraction method. In this technique firstly semantic and syntactic of the original biomedical literature were obtained. Then convolutional operations were applied to extract features raw biomedical literature. Finally softmax function was applied for extracting DDIs from literature. Experiment show that performance of DCNN improves as network became deeper. This provided better result than SVM, RNN and CNN. As network goes deeper, overfitting and degradation problems arise. These problems can be future referenced.

Sonaal Kant and Muktabh Srivastava [11] developed a new deep neural network based TB diagnosis methodology. This method can effectively used for detecting microscopy images of sputum bacillus. This method take microscopy images of sputum with proper zoom level as input and output locations of suspected Mycobacterium tuberculosis bacilli. Dataset 3 from ZiehlNeelsen Sputum smear Microscopy image DataBase (ZNSM-iDB) are used for experiment. This method can scalable to larger dataset and can help in reducing the burden of TB screening centres across the nation.

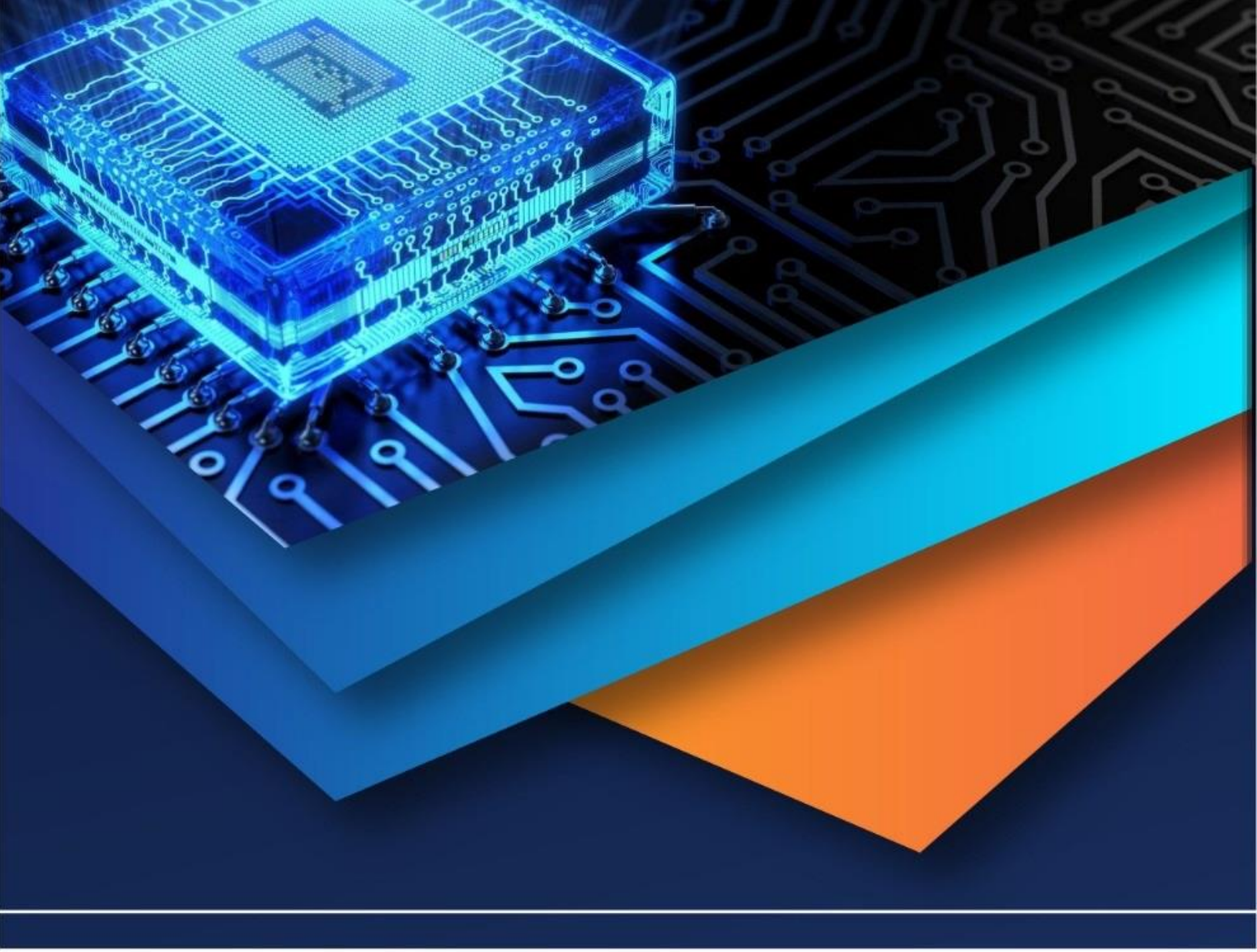
IV. CONCLUSION AND FUTURE SCOPE

deep learning is an attractive technique for analyzing biological data and images of medical diagnosing fields. It has shown a great potential in promoting medical industry. From the literature review, it is observed that there is huge scope of work in the field of medical diagnosis with the help of deep learning techniques.

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