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## Detection and Classification of Bone Tumor using Deep Learning

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**ABSTRACT:** Bone disease is treated as an extreme medical condition, and, as a rule, it causes patient passing. Early location of bone disease is proficient in diminishing the spread of harmful cells and reducing mortality. Since the manual identification process is a difficult undertaking, it is expected to plan a robotized framework to order and recognize the harmful bone and the sound bone. In this venture we are identifying the bone diseases utilizing profound learning and using CNN for it. In the present research work, we are developing a web page where the client needs to first register and can upload a bone image in jpeg format and check the bone malignant growth. This would encourage the use of a developed detection model by an authorized user for the fast decisions. The training accuracy of the model is 94.79% and the training loss of the model is 0.14%. The validation accuracy is 92% and the validation loss is 0.34.

KEYWORDS: Convolutional Neural Network, Deep Learning, Image Processing, Bone tumor

#### I. INTRODUCTION

Bone tumors are a serious health issue, occurring in patients of all ages and having the potential to cause serious complications if not detected and treated early. Proper detection and diagnosis of bone tumors are critical for successful treatment planning and enhancing patient outcomes. Traditional diagnostic methods, such as diography, computed tomography (CT), and magnetic resonance imaging (MRI), are based on the skills of radiologists, which can introduce subjective interpretation and diagnostic variability. Recent developments in deep learning and artificial intelligence (AI) have exhibited tremendous potential for medical image analysis, providing higher diagnostic accuracy and efficiency. Convolutional neural networks (CNNs) have been particularly successful in image classification tasks and have proven to be highly applicable to medical imaging processes. Incorporation of such automatic methods can aid radiologists in making more standardized and accurate interpretations, lowering the rate of diagnostic errors. Growths can be ordered into two sorts: destructive and non-harmful. Careful expulsion of harmless (non-malignant) cancer is simple and the greater part of the harmless growth doesn't develop once more. The dangerous tumor(cancerous) contains the bigger cores in contrast with the harmless cancer. Bone malignant growth clinically named as sarcomas which start in muscles, stringy tissue, bone, veins and different tissues of the body. Some normal kinds of disease are chondrosarcoma, osteosarcoma, pleomorphic sarcoma, ewing's sarcoma, fibrosarcoma. In bone disease cancer begins developing in the bone, influencing the development and development of bones. There have been many enrolled instances of bone disease or growth across the world with lethal cases including excessively because of bone disease. Subsequently, recognizing them at the beginning phases becomes vital which can save many lives.

#### **II. PROPOSED METHODOLOGY**

1.Proposed Strategy:

In this undertaking we will recognize bone malignant growth utilizing profound learning. Bone malignant growth identification utilizing profound learning includes gathering and preprocessing marked clinical pictures like X-beams, X-rays, or CT filters, frequently expanding the information to increment variety. CNN models are regularly utilized while distinguishing bone disease. The model is then prepared, approved, and adjusted to identify malignant locales in the pictures precisely. The system designing of the proposed model is shown in fig.1.



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#### Fig1. Proposed Methodology

In this venture we will recognize bone malignant growth utilizing profound learning. Bone malignant growth discovery utilizing profound learning includes gathering and preprocessing named clinical pictures like X-beams, X-rays, or CT checks, frequently enlarging the information to increment variety. Consequences be damned models are generally utilized while recognizing the bone disease. The model is then prepared, approved, and adjusted to recognize malignant locales in the pictures precisely.

#### A] Dataset Gathering

The dataset gathering is the initial step of any AI or profound learning project. The dataset contains all out 288 pictures of bone growths. We involve 90% information for preparing and 10% information for testing. We have divided the information into two sections: preparing and testing

#### B] Resized

In preprocessing we have resize the image into 224\*224.

#### C] Data Augmentation

Information expansion is valuable to work on the exhibition and diminishes overfitting.

In this step we are playing out certain changes on pictures, for example, turn the Picture into 40 degree/point, zoom the picture with 0.2 scale factor and change the Difference of unique picture.

It assists with resolving issues like overfitting and information shortage, and it makes the model vigorous with better execution.



#### D]Web page

#### Fig2. Registration page



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#### Registration Page: Creating an Account

If a user doesn't have an account, they can head to the registration page. Here, they need to provide a username (which is often unique), email (for verification and communication) and a password (entered twice to confirm accuracy). Once they fill out the form and click the register account button, their details are submitted, and they can then log in. A login link at the bottom makes it easy for users who already have an account to switch back.



#### Fig3. Web Page design

Login Page: It contains Username and Password for verification purpose. There's also a Login button to submit the credentials and a Sign-Up link for new users who haven't created an account yet. The icons beside the fields make it visually easy to understand what information needs to be entered.

#### **III. ALGORITHM**

#### I. CNN:

CNN (Convolutional Neural Network) is a deep learning algorithm mainly used for image processing. It automatically detects important features like edges, shapes, and patterns using layers such as convolution, pooling, and fully connected layers—making it highly effective for tasks like image classification and object detection.



#### Fig4. CNN Design



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#### **IV. RESULT AND DISCUSSION**



Fig 8. Accuracy graph

Accuracy of model can be calculated by using following equation,

Accuracy = 
$$\frac{\text{Correct predicted images}}{\text{Total no. of images}} \dots (1.1)$$

Model accuracy comparison graph tracks how accurate the model is while training and testing. The x-axis shows the number of training cycles (epochs), while the y-axis represents accuracy.

The blue line represents training accuracy, and the orange line represents test accuracy. As training progresses, both lines show improvement, but the test accuracy is increasing much faster than the training accuracy.



Fig 9. Loss Graph

Loss of model can be calculated by using following equation,

This graph shows how much error (or "loss") the model is making during training and testing.

The blue line represents training loss, which is decreasing steadily—this means the model is learning from the data. However, the orange line (test loss) first increases and then slightly decreases.

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**V. CONCLUSION** 

In summary, this research reveals the capacity of deep learning to improve bone tumor detection and classification accuracy and efficiency. With the integration of AI-based strategies into a web platform, we present an easy-to-use and accessible system for both clinicians and patients. Uploading medical images, getting rapid analyses, and reading results with clarity can facilitate early diagnosis and timely treatment planning. While remarkable progress has been made, there are still areas of research left to be done in terms of dataset constraints, imaging quality variations, and explainability of AI models. Subsequent work will be aimed at improving the deep learning models, integrating multimodal data sources, and creating real-time applications for increased clinical use. With further advancements, AI-based solutions promise much in the way of changing diagnostic approaches, ultimately leading to more accurate and efficient bone tumor management.

#### REFERENCES

[1] Eatedal Alabdulkreem, Muhammad Kashif Saeed, Saud S. Alotaibi, Randa Allafi, Abdullah Mohamed, And Manar Ahmed Hamza "Owl Search Algorithm With Deep Learning on X-Ray Images" Digital Object Identifier 10.1109/ACCESS.2023.3319293

[2] R.S. Savage, Y. Yuan, Predicting Chemo insensitivity in breast cancer with omics/digital pathology data fusion, R. Soc. Open Sci. 3 (2) (2016) 140501.

[3] A. Madabhushi, G. Lee, Image analysis and machine learning in digital pathology: challenges and opportunities, J. Med. Image Anal. 33 (2) (2016) 170175.

[4] L. Xiang, Y. Qiao, D. Nie, L. An, Q. Wang,

D. Shen, Deep auto-contex convolutional neural networks for standard-dose PET image estimation from low-dose PET/MRI, J. Neurocomput. 267 (1) (2017) 15.

[5] N.E. Bylund, M. Andersson, H. Knutsson, Interactive 3D filter design for ultrasound artifact reduction, IEEE International Conference on Image Processing, Genova, Italy, 2005, pp. 725728.









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