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IDENTIFICATION OF BONE CANCER USING IMAGE PROCESSING

Y. Rajesh[1*], Sk. Mastan Shareef[2], G. Ajay Kumar[2], K. Bhargav[2]
[1]Asst. Professor, Department of Computer Science and Engineering, Andhra Loyola Institute of Engineering and Technology, Vijayawada, Andhra Pradesh, India.
[2]Andhra Loyola Institute of Engineering and Technology, Vijayawada, Andhra Pradesh, India.
***Corresponding Author's email:** rajeshrajiv1324@gmail.com

Abstract: Bones are the most important part of the human body for mobility. Human bones are frequently affected by fractures, tumors, and cancer. The detection of these is a difficult task because manual prediction and detection take more time and accuracy to detect bone cancer. Image processing techniques are used in this paper to process cancerous and non-cancerous bone images, and bone cancer is detected. A preprocessed MRI image has had the noise removed from it. The image is preprocessed using a median filtering algorithm. Then we used the thresholding algorithm to improve the image. . This is followed by feature extraction, in which the images are classified using the extracted features. Bones are the most important part of the human body for mobility. Human bones are frequently affected by fractures, tumors, and cancer. The detection of these is a difficult task because manual prediction and detection take more time and accuracy to detect bone cancer. Image processing techniques are used in this paper to process cancerous and non-cancerous bone images, and bone cancer is detected. A preprocessed MRI image has had the noise removed from it. The image is preprocessed using a median filtering algorithm. Then we used the thresholding algorithm to improve the image. This is followed by feature extraction, in which the images are classified using the extracted features.

This project aids in the early detection of bone cancer, allowing for proper medical treatment to be provided at an early stage.

Keywords: Thresholding, Segmentation, Median filtering, preprocessing.

1 INTRODUCTION

Connective tissue, sensory tissue, epithelial tissue, and muscular tissue are the four types of tissue that make up the human body. Fitting connective tissues and specialized connective tissues are two distinct tissue components of the connective tissues. These particular connective tissues are bone tissue with a hard firmness and are vascularized by blood vessels. A large number of mineral ions and collagen strands in an extracellular network give bone tissue its hardness. Osteoblasts, osteoclasts, and osteocytes are the three types of cells that make up this tissue. The skeleton is made up of 206 bones, with cortical bone accounting for around 80% of all bone mass and trabecular bone accounting for 20%. An osteon is a biological feature of bone that resembles a harbourharvesian canal encircled by concentric layers of bone. They exhibit varying levels of intensity in the osteon areas, which reflect the mineralization level. At the earliest stage, any fracture or abnormalities (cancer) in the bone must be expected to cure. Osteosarcoma, a malignant primitive bone tumor, is a kind of human bone cancer. There may be a progression of stage condition that extends to other areas or organs, a process termed as metastasis. Dissemination of cancer cells happens at this stage, resulting in patient death. Bone cancer, like other carcinomas of the prostate, lungs, thyroid, and liver, must be identified to offer health treatment.

2 LITERATURE SURVEY

The major cause for the death of cancer throughout the world is due to the prediction level before the metastases stage. Lesions occur in the breast, lung, prostate, and kidney comprised 80% of all metastases to bone. It has been estimated that 1.04 million new cases of lung cancer were diagnosed during 1990. Bone scan demonstrates the possible evidence of bone metastasis and it was suggested that bone scanning with 99m monophosphate detected early bone metastasis in few cases with bronchogenic carcinoma before these lesions became evident clinically or radiographically.

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Monitoring, treatment, and assessment were done following radiation therapy in the old methods, and they were based on the results of CT and MRI scans. However, these approaches are referred to as anatomical imaging, which has the benefit of allowing for a high-resolution picture of the anatomy and driving the use of very complex RT techniques.

The discrete wavelet transform (DWT) developed by Donoho and Johnstone in 1994 is widely used as part of the wavelet thresholding de-noising system for ECG signal de-noising. To eradicate the additional substance commotions, Sayadi O and Brittain J. S. 2008 used Wiener and Kalman filtering techniques. Harishchandra T. Patil et al., 2013, proposed a wavelet decomposition-based method for edge estimation for ECG signal de-noising, in which the threshold is recorded using the most extreme and least wavelet coefficients at each level.

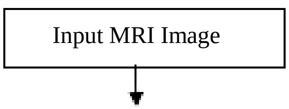
Wavelet provides a very poor and ineffective representation of images. Recently, a few wavelet-based plans for bone tumor inquiry were revealed. In this part, we discussed the many applications of wavelet-based image processing. Wavelet represents images in a way that is both insufficient and effective. A few wavelet-based mammogram examination plans have recently been presented. They used an array of measurable elements in their mammogram investigation study, as well as a doubletree classifier in their analytical framework. Ferreira and Borges (2003) demonstrated that the largest wavelet coefficients in low recurrence (near estimation) wavelet changes may be used as a mark vector for comparing mammograms.

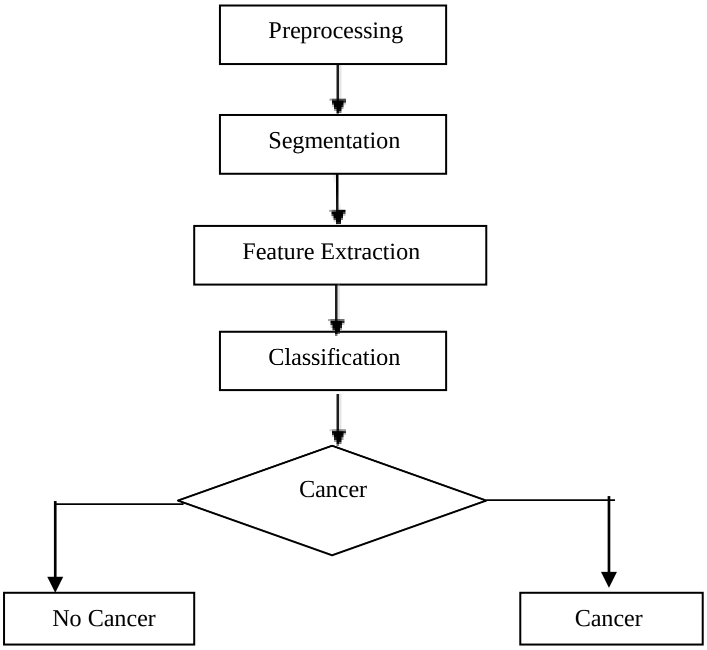
In multilevel disintegration, Essamet al.2007 used a multidetermination mammography examination to focus a percentage of the highest coefficients of the estimate. Nisthula et al. (2013) use a variety of image treatment methods, such as contrast enhancement, edge finding, and picture combining, to identify cancerous tissue in bone in a simple, rapid, and reliable manner.

3 METHODOLOGY

The method of the proposed system for brain cancer detection follows four basic tasks namely, preprocessing, segmentation, feature extraction, and classification. As stated above, the acquired MRI scan image is preprocessed. The preprocessed image is segmented. Later, we extract the features from the segmented image. At last, we classify the image based upon the extracted features, area.

The following flowchart depicts the processes done in the paper.





3.1 ImagePreprocessing:

At this point, we're mostly concerned with picture improvement. The primary goal of image enhancement is to improve the impression of the picture's data. As a result, the results are better suited for additional picture processing. To obtain a better outcome, we transform the color image into a binary image. This level entails several distinct steps.

3.2 Image Segmentation:

In the image processing procedures, this stage is crucial. The picture is separated into multiple segments, as the name segmentation implies. The tumor area is located by dividing the image into sections depending on the properties of the pixels. To obtain the tumor portion, the preprocessed picture is transformed into a binary image. In segmentation, there are four steps to follow.

3.3 Feature Extraction:

Feature extraction is the process of minimizing the number of resources needed to explain a big amount of data. One of the biggest issues with doing sophisticated data analysis is the large number of variables involved. A high number of variables necessitates a lot of memory and processing resources, and it can also lead a classification algorithm to overfit training data and fail to generalize to new samples.

Feature extraction is a broad phrase that refers to strategies for generating combinations of variables to get past these issues while still accurately characterizing the data. We extract two characteristics in our system: area and perimeter.

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These characteristics are used to classify a tumor in a photograph.

3.3.1. Area:

Using the nnz function, which returns the number of non-zero elements in a matrix, we estimated the number of white pixels in the binary picture.

3.3.2Perimeter:

Using the bwperim function, we computed the perimeter pixels of binary image objects. It returns a binary image that only contains the perimeter pixels of the input picture's objects.

If a pixel is nonzero and linked to at least one zero-valued pixel, it is considered part of the perimeter.

3.4.Classification:

Image classification is a computer vision method that can categorize an image based on its visual information. For example, an image classification algorithm might be created to determine whether or not a picture contains a human figure. While recognizing an item is simple for humans, effective picture categorization in computer vision applications remains a problem. To categorize the tumor among the retrieved characteristics, we evaluate the feature area. We have two target classes here, which are 0 and 1. If class 0 denotes the absence of cancer and class 1 denotes the presence of cancer. We categorized the acquired picture after assessing the tumor's size. All of the MRI pictures in the dataset were evaluated in their relevant areas. After that, we established threshold values for each level.

3.5Block Diagram of Proposed System :

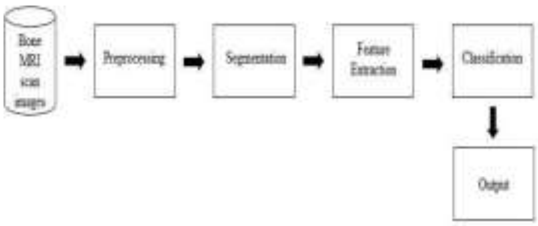

Fig. 3.5.1: Block Diagram

4 RESULTS

4.1 Result of Cancerous image :

Fig 4.1.1 Main Window

Fig 4.1.2 Input MRI image

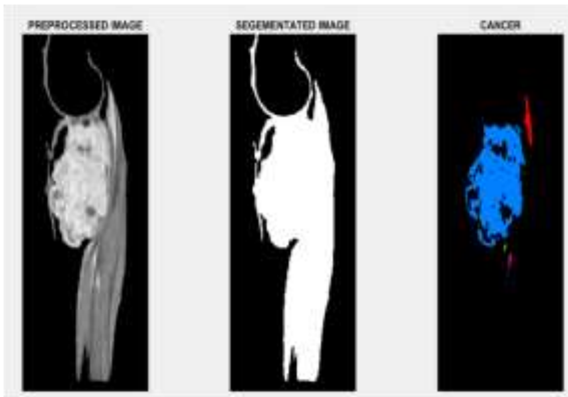

Fig 4.1.3 Each Module Output

Fig 4.1.4 Classified Output

4.2 Result of Non-cancerous image:

Fig 4.2.1 Main Window

Fig. 4.2.2 Input MRI image

Fig. 4.2.3 Each Module output

Fig. 4.2.4 Classified Output

5 ADVANTAGES

The Following are the Advantages of the proposed system

1. A computer-assisted diagnostic (CAD) system has been developed to identify tumors in less time.
2. Aside from segmentation, features are retrieved and used to classify the data.
3. The accuracy will be higher than that of current systems.
4. The perimeter of the tumor will be indicated.

6 CONCLUSIONS

In this paper, we present an algorithm that can identify bone cancer and provide results, in comparison to other commonly used approaches. This algorithm is capable of detecting the tumor with ease. If there is no tumor in the supplied picture, the result is No Cancer. If a tumor is detected in the supplied picture, Cancer is shown. The suggested method would be useful in assisting doctors in determining if a picture is malignant or not. As a result, patients can be rehabilitated at an early stage.

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8 REFERENCES

Here, are some of the references for the project from various sites, journals, papers, etc...

[1]. Ta V.T., Lezoray O., El Moataz A., Schupp S., Graph-Based Tools for Microscopic Cellular Image Segmentation. Pattern Recognition, 2009, Vol. 42, 6, 1113−1125.

[2]. Liu Sheng, Charles F. Babbs, Edward J. Delp "Multiresolution detection of spiculated lesions in digital mammograms", IEEE Transactions on Image Processing, 2001, 10 (6), 874–884.

[3]. C.B.R Ferreira, D.L. Borges [2003], Analyses of mammogram classification using a wavelet transform decomposition, Pattern Recognition Letters, 2003, 24, 973–982.

[4]. Essam A. Rashed, Ismail A. Ismail, Sherif I. Zaki, "Multiresolution mammogram analysis in multilevel decomposition", Pattern Recognition Letters, 2007, 28, 286–292.

[5]. Nisthula P, Mr.Yadhu.R.B,. "A Novel Method to Detect Bone Cancer Using Image Fusion and Edge Detection", International Journal of Engineering and Computer Science ISSN: 2319-7242 Volume 2 Issue 6 June2013.

[6]. K. Sujatha and Dr. N. Pappa, (2010) Combustion Quality Estimation in Power Station Boilers using Median Threshold Clustering Algorithms, International Journal of Engineering Science and Technology Vol. 2(7), 2623-2631.

[7]. N.P.G. Bhavani, Dr. K. Sujatha,(2014)Soft Sensor for Temperature Measurement in Gas Turbine Power Plant, International Journal of Applied Engineering Research, pp.21305-21316.

[8]. Sujatha, K. Pappa, N. Senthil, K. Kumar, and SiddharthNambi, U. (2013) Monitoring Power Station BoilersUsing ANN and Image Processing, Trans Tech Publications, Switzerland, Advanced Materials Research, Vol. 631-632, pp.1154-1159.

[9]. Sujatha, K. Pappa, N. Senthil, K. Kumar, SiddharthNambi, U. and Raja Dinakaran, C. R. (2013) Intelligent Parallel Networks for Combustion Quality Monitoring in Power Station Boilers, Trans Tech Publications, Switzerland, Advanced Materials Research, Vol.699, pp.893-899.

[10]. Sujatha, K. Pappa, N. Senthil, K. Kumar, SiddharthNambi, U. and Raja Dinakaran, C. R. (2013) Automation of Combustion Monitoring in Boilers using Discriminant Radial Basis Network, *Int. J. Artificial Intelligence and Soft Computing*, Vol. 3, No. 3.

[11]. RSML Patibandla, AP Gopi, BT Rao (2021), Comparative Study on Analysis of Medical Images Using Deep Learning Techniques, Deep Learning for Biomedical Applications, 2021.

[12]. BT Rao, RSML Patibandla(2021), Comparative Study on Security and Privacy Issues in VANETs, Cloud and IoT-Based Vehicular Ad Hoc Networks, 2021

[13]. A Peda Gopi, (2020)," Design and Analysis of CMOS LNA with Extended Bandwidth For RF Applications", Journal of Xi'an University of Architecture & Technology, Vol. 12, Issue. 3,pp.3759-3765.

[14]. Sujatha, K. (2012) Flame Monitoring in power station boilers using image processing, ICTACT Journal on Image and Video Processing.