



Calculation of bone Disease using Image Processing

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ABSTRACT

The designed system used to measure the bony fracture by using image processing and it also detects the bone tumor of the person. Every human has a various osseous length so by applying image processing it also give the length of the bony. The bony tumor is not a cancer it just form like a tissue formed over the osseous matter it reduce the bony strength. It very useful in real time. This mainly contribute about the bone density and it also checkout what are all the causes for bone weakness. It also gives the 3 dimensional view of the density distribution in the human body. And it gives the visage like height, weight of the human. The system contributes on estimation of lower limb kinematic analysis. It finds the GRF between the human body and ground

Keyword: GRF, Osseous Length, Kinematic Analysis, Osseous

I. INTRODUCTION

Bones are the solid organs in the human body defensive many significant organs such as brain, heart, lungs and further interior organs. The human body has 206 bones with various shapes, size and structures. The largest bones are the femur bones, and the smallest bones are the auditory ossicles. Bone fracture is a familiar trouble in human beings. Bone fractures can occur due to accident or any other case in which high pressure is applied on the bones. Bone density is an important feature to humans bone health and measuring it is an important ask in medical image processing area. The mathematical models of bone density have direct consequences in possible predictions and making important diagnostics in terms of bone related treatments. Bone density is define as the quantity of bone tissue in assured capacity of bone. The strength of a bone is believed to be related to and can be determined by the density of the bone structure. Moreover, bone density also measures the amount of bone mass present. It predicts fracture risks, observes the usefulness of treatments, and measures the amount of calcium in a specific region of the bone. A bone tumor, (also spelled bone tumour), is a neoplastic growth of tissue in bone. Anomalous growth found in the bone can be either benign (noncancerous) or malignant (cancerous). Bone tumors may be classified as "primary tumors", which originate in bone or from bone-derived cells and tissues, and "secondary tumors" which originate in other sites and spread (metastasize) to the skeleton. The survival of bone cancer patients is related to the extent of their disease at the time of diagnosis. In the absence of distant metastases, the spread of tumors to the mediastinal lymph nodes is a major determinant of both the prognosis and the therapeutic approach. Proper staging is important for selecting patients who may benefit from

surgical resection and for defining the treatment modalities of patients who will undergo radiotherapy. The strength of a bone can be determined based on BMD. In addition, BMD measures the amount of bone mass, predicts fracture risks, observes the usefulness of treatment, and measures the amount of calcium in a specific region of the bone. This process used to detect the bone fracture in step by step process input as bone image, and the preprocessing helps to improve the image data, edge processing used to find the boundaries of an image, and the segmentation used for partitioning and then it classify the images

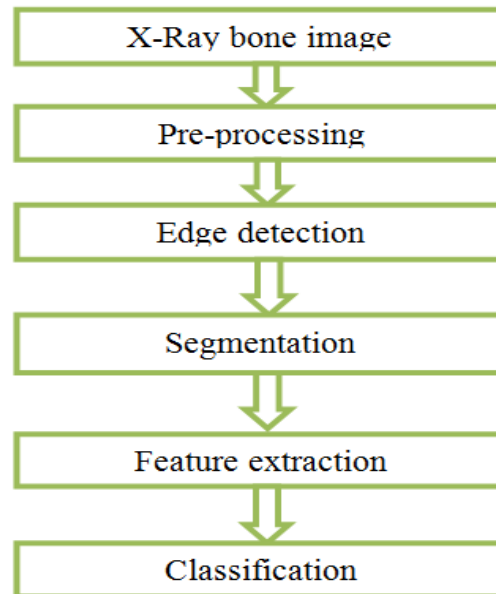


Fig 1 : The flow diagram of steps in detecting the bone fracture in X-ray/CT images

II.NOISE REMOVAL

In computer-aided analysis of the medical imagery, image processing tools for noise removal, image segmentation and characteristic removal play a important role in the achievement of such systems. The X-ray/CT images are obtained from the hospital that contains normal as well as fractured bones images. In the first step, apply preprocessing technique such as RGB to grayscale exchange and take out the noise from the image by via the median filter.

Noise can be defined as unwanted pixels present in the image that degrade the quality of the image. It can be written as:

$$f(x, y) = g(x, y) + \eta(x, y)$$

Where $f(x, y)$ is the noisy image, $g(x, y)$ is the original image and $\eta(x, y)$ is the noise present in the image. There are different types of noise present in the image are Gaussian noise, Salt and pepper noise etc. Salt and pepper is one of the common types of noise current in x-ray images. This is generally caused by a failure in capture or transmission that is appearing in the image as light and



black dots. It can be detached by apply mathematical conversion on the images. It conserve the boundaries while remove noise. The median filter is a nonlinear digital filtering technique, used to remove noise such as salt and pepper noise.

III. RELATED WORKS

In 2014 Elyse passmore and morgan sangeux proposed the 3D gait analysis system that has been used to improving volume origin and coordinate system and 3D system improve the system performance. In 2014 Gennady and yu.Kulikova has been Accurate Numerical implementation of continuous-discrete kalman filter that used to involve the activity of coordinate system performance and it develops the improved gait analysis.

In 2009 J.Favre and R.Aissaoui develops the system for 3D knee joint angle that used to perform functional calibration and joint angle description .

In 2011 Zhi-Qiang Zhang, Wai -Choong Wong has been used for upper-motio estimation analysis used to analysis the interactive gait rehabilitation

IV. PROPOSED METHOD

In proposed system used to extract the features of bone and it used to increase the resolution and efficiency level of an input. Here, the dicom used to view the 3 dimensional view of bone density it gives the exact level of a density in fig1 and it also finds the all supplements in bone. To find a bone cancer and fracture it gives high resolution to find level of a cancer and fracture in the bone. It is the combined process of a bone feature extraction.

Edge Detection

Edge detection is significant process in image processing, that decrease the number of pixels and save the arrangement of the image by decisive the boundaries of objects in the image. Edge detection is the method of identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed edges. There are two general approaches to edge detection that are commonly used are: gradient and Laplacian. Gradient method use the first derivative of the image, and the Laplacian method use the second derivative of the image to find edges. In our method use sobel edge detector and it is a gradient family.

Segmentation

Segmentation is the process of dividing the given image into regions homogenous with respect to certain features as color, intensity etc. It is an essential step in image analysis and locates object & boundaries (lines, curves etc). The K-means clustering technique is used in this work. The purpose of this algorithm is minimizing an objective function, which is absolute difference function. In this



algorithm distance is squared or absolute difference between a pixel and cluster center is calculated. The difference is typically based on pixel intensity, color, texture and location. The quality of the solution depends on the initial set of clusters and value of k. After the segmentation crop the image and the area of fracture with some limitation.

Feature Extraction

Feature extraction is the main step in various image processing applications. Gray-Level Co-occurrence Matrix is used for feature extraction and selection. GLCM was defined by Haralick et al. in 1973. GLCM is main tool used in image texture analysis. Textures of an image are complex visual patterns that are composed of entities or regions with sub-patterns with the characteristics of brightness, color, shape, size, etc. GLCM is a statistical way to indicate image texture structure by statistically sampling the pattern of the grey-levels occurs in relation to other grey levels. We use the Gray Level Co-occurrence Matrix (GLCM) method to extract textural features such as entropy, contrast, correlation, homogeneity.

V. BONE DENSITY

It finds by, The T-score is the standard deviation (SD) of the patient's BMD above or below the mean for the Young-Adult normal reference population. The Z-score is the SD of the patient's BMD above or below the mean of the Age-Matched

T Score = (BMD of patient - Average BMD of Young-Adult)

SD of Young-Adult

Z score = (BMD of patient - Average BMD of Age-Matched)

SD of Age-Matched

V.RESULTS

The result of bone density in 3D view

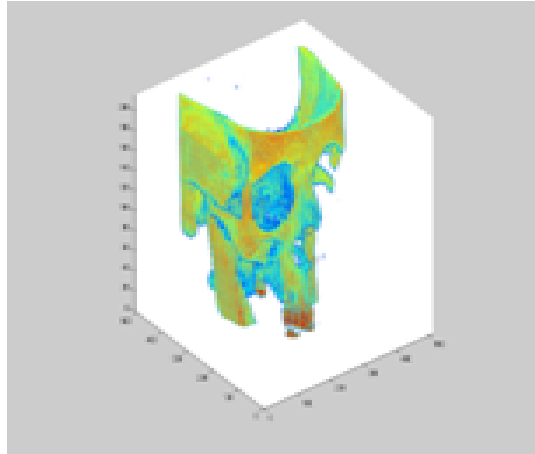


Fig1: bone density

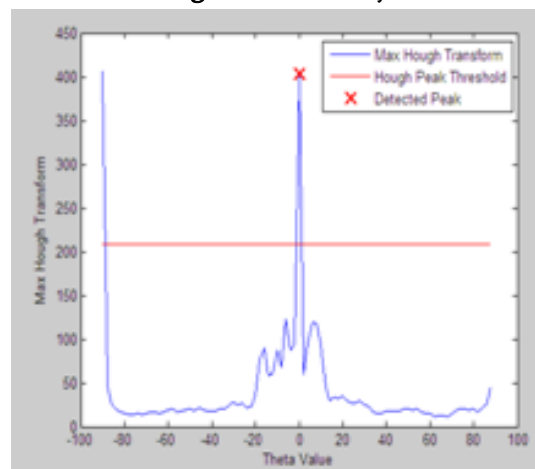


Fig2: bone fracture



Fig3: bone density detection

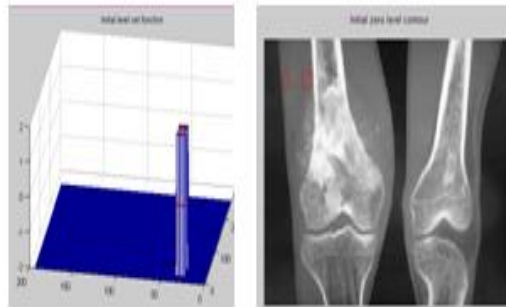


Fig4: bone cancer detection

VII. CONCLUSION

Here, we can able to predict the disease of bone density ,bone cancer and other bone diseases, The given image processing increase the saturation level of an output. So we can able to identify the exact level of an disease. It increase the output efficiency of an given input.

VIII. FUTURE WORK

Hardware implementation for bone density calculation

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