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DETECTION OF SARCOMA IN BONE

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Abstract: Sarcoma is a serious disease in the medical sector. During their lifetime, several people will be infected by some form of tumor. Among various types of cancer, Bone cancer is a leading cause of cancer-related death in many countries. The main goal of this model is to find out the malignant part i.e.by comparing two medical imaging techniques such as CT scan and X-Ray, detects the types of tumor in accurate manner. The images that are scanned may not be having high resolution due to the noise and redundancy present in the pixels, hence the first step is to preprocess these scanned images using extensive image processing tools. The particular features will be selected using k-means clustering algorithm and GLCM is used to extract the features of the images. By using CNN classifier, the extracted images will be classified and stored. Based on these classification, the stages of sarcoma will be identified which is useful for the orthopedic surgeon to give suggestions over the treatment. The developed system result shows the improved rate of early detection of Sarcoma in Bone.

I. INTRODUCTION

Cancer is one of the important causes of death for both men and women. The early detection of sarcoma in bone will be helpful to completely cure the disease. So the need of techniques for detecting the presence of tumour in early stage is increasing day-by-day. Due to the unusual growth of cells in the body, tumour will occur. Scanned medical images give details about the shape and function of organs of human body which helps in the process of diagnosis. Medical images are play an important role for controlling the diagnostic actions. The affected or malignant of the body is determine by numerous medical techniques available. The growth which is spreading beyond the Bone is a process known as metastasis and also spread into other parts of the body. If uncontrolled growth detected successfully at early stages helps to proceed with many treatment options, which reduces risk of invasive surgery and increased survival rate. Survival depends on stage, overall health, and other factors, but overall only 14% of people who are diagnosed with Bone cancer can survive five years after their diagnosis. PET/CT is a medical imaging technique or a device which combines the both a positron emission tomography scanner and computer tomography scanner in single gantry system, so that images collected from both medical devices can be taken parallelly, and then combined into a single superposed image. Computed tomography (CT) able to define the stages of the tumour, both anatomically & functionally. The proposed model will be helpful to detect the sarcoma in early stages.

I. RESEARCH METHODOLOGY

Preprocessing of Image:

Preprocessing involves image improvement which reduces the noise present in the image and groups image features important for further processing of image. The preprocessing of image aims at selectively removing the redundancy present in scanned images without affecting the details which that play a role in the diagnostic process.

1.Image Collection:

Input to proposed system is Classification of CT Scan images, CT images are taken. Itis type of intensifier used to take pictures of CT Images.

2.Image Preprocessing:

The main aim of pre-processing is to improve the image data to reduce unwanted distortions and enhances some image features which are important for further image processing. Image pre-processing involves three main things a) Gray scale conversion b) Noise removal c)Image enhancement.

a) Grayscale conversion:

Grayscale image contains only brightness information. Each pixel value in grayscale image corresponds to an amount or quantity of light. Grayscale image measures only light intensity 8 bit image will have brightness variation from 0 to 255 where '0' represents black and '255'represents white. Grayscale images are more easy and more faster to process than colored images. The required image processing technique are applied on grayscale image. In our proposed system CT scan image is converted into grayscale image.

b) Noise Removal:

The purpose of noise removal is to detect and remove disruptive noise from digital image. The complexity is in deciding which characteristics of an image are real and which are caused by noise. Noise is random variations in pixel values. In our proposed system we are using median filter to remove unwanted noise. Median filter leaves edges invariant. Each sample value is sorted by magnitude, the centremost value is median of sample within the window, is a filter output.

c) Image Enhancement:

The image enhancement makes it easier for image interpretation. This helps in yielding better quality result.

Segmentation of Image:

Once the image processing is done the segmentation of bone tumour area around the CT images. The adjustment of black and white images produced with its contrast for providing better segmentation. Here an Optimal threshold is applied on the pre-processed Bone image to select a segmentation threshold to separate the body and non-body pixels through an iterative procedure. The density of pixels and the threshold values are compared then assigned a value 1 and value 0 respectively. i.e lower values assigned to 1, then 0 for other pixels.

Extraction of feature:

Feature extraction clarifies the amount of resources required from a large set of n data accurately. The GLCM is used to capture spatial dependency between image pixels. It works on gray level image matrix to capture most common feature such as contrast, entropy, energy, and cluster-shade. Feature extraction plays an important role in extracting information present in given image. Here we are using GLCM for texture image analysis. GLCM is used to capture spatial dependency between image pixels. GLCM works on gray level image matrix to capture most common feature such as contrast, entropy, energy, homogeneity, correlation, ASM, cluster-shade.

Contrast

$\sum i \sum j$

$(i - j)$

$2\ C(i,j)$

Energy

$\sum i \sum j C$

$2(i,j)$

Homogeneity

$\sum i \sum j$

$C(i,j)$

$1 + |i - j|$

The purpose of feature extraction (glcm) is to suppressed the original image data set by measuring certain values or features that helps to classify different images from one another.

Classification of Image:

By making use of CNN the mapping of non-linear input data to the linear data provides good classification in high dimensional space, the marginal distance is maximized between different classes. The binary classifier which makes use of the hyper-plane which is also called as the decision boundary between two of the classes is called as Convolution Neural Network. Some of the problems are pattern recognition like texture classification makes use of CNN. Mapping of non-linear input data to the linear data provides good classification in high dimensional space in CNN. The marginal distance is maximized between different classes by CNN. Different Kernels are used to divide the classes. SVM is basically binary classifier which determines hyper plane in dividing two classes. The boundary is maximized between the hyper plane and two classes. The samples that are nearest to the margin will be selected in determining the hyper plane is called support vectors.

IV. RESULTS AND CONCLUSION

This model determines the cancer affected areas and determines the stages of the sarcoma. So this helps the doctors and patients to determine the cure and get awareness about the problem.

The proposed system of bone tumor detection with super pixel segmentation is implemented using Open CV Python. Also the detection of bone cancer is carried out with the given set of images. The proposed system is specially dedicated for bone cancer detection . The same system can be determines the stages too.

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