Eleyon
SOUTH ASIAN JOURNAL OF ENGINEERING AND TECHNOLOGY

Full Length Article

ANALYSIS AND DETECTION OF BONE TUMOR IN MRI IMAGE USING MACHINE LEARNING

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ABSTRACT: In the field of bio-medical, tumor detection in early stages is the trending research topic as most of the tumors indicates the early stages of cancer. A lot of work have been done on the tumor detection and identification. So, the point of discussion is to find out the identification and detection system which is fast and reliable. In this paper an approach of tumor detection using machine learning have been discussed and the data set for the performance analysis is MRI images. This paper specifically dedicated for the bone tumor detection. Also the algorithm have been implemented in openCV so as to make the system more fast and convenient.

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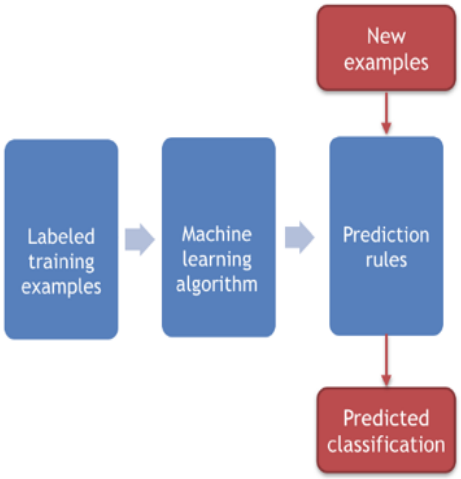
Keywords: Tumor detection, cancer, machine learning, MRI,OpenCV.

1 Introduction

Bone is the supporting skeleton of body and is hollow. The outer part of bones is a arrangement of tough tissue called matrix against calcium salts are laid down. The hard out layer is made with cortical bone, it covers trabecular bone inside, outside of bone covered with periosteum. Some bones are hallow and space is called medullary cavity which contains the soft tissue called bone marrow. Endosteum is act as a tissue lining. At each end of the bone is a region of a softer shape of bone-like tissue called cartilage, it is softer than bone that is made of fibrous tissue matrix assorted with a gel-like stuff that does not enclose much calcium. Most bones get going out as cartilage. The body then put downs calcium onto the cartilage to form bone. After the bone formation, some cartilage may stay at the ends to act as a bolster between bones. This cartilage, along with ligaments and some other tissues join bones to form a joint. Bone itself is very stiff and muscular. Bone is able to hold up as much as 12,000 pounds per square inch. It takes as much as 1,200 to 1,800 pounds of pressure to break the thigh bone. The bone contains 2 kinds of cells. The osteoclast is the cell that form new bone, and the osteoclast is the cell that softens old bone. some bones the marrow is greasy tissue. The marrow in other bones is a concoction of fat cells and blood-forming cells. The blood-forming cells fabricate red blood cells, white blood cells, and blood platelets. Other cells in the marrow include plasma cells, fibroblasts, and reticuloendothelial cells.Cancer, which makes unfettered cell growth, will subdivide the cells and grow wildly, forming malevolent tumors, and assault nearby parts of the body. This tumor can grow and impede the digestive, nervous, and circulatory systems and they can liberate hormones that amend body function. Cells treated as cancer cells **2** because of injure to DNA. In a regular cell, when DNA damaged the cell upkeep the damage or the cell dies. If the damaged DNA isnt repaired, and die that damaged DNA causes to making unnecessary new cells. Cancer cells often moves to other parts of the body, and begin to produce tumors that reinstate to regular tissue. This process is called metastasis. After that cancer cells get into the bloodstream or lymph vessels of human body.There are different types of cancer that are detected in human body. If the tumor is directly affected to bone then that type of disease is known as Bone cancer. bone cancers are called sarcomas. Sarcomas are initiate in muscle, bone, fibrous tissue, blood vessels, fat tissue, as well as some other tissues. They can expand anyplace in the

body. Bone refashion activity is only due to Cancer cells in the Bone. Normal bone is indefatigably being amended, or conked out and rebuilt. Cancer cells offend the balance for growth and formation of cell in bone. If cancer cells are in the bones, then the structure of bone is bent at a higher rate when compared to normal bone rate. Mostly bone cancer will be of primary or secondary . Primary bone cancer occurs in the bone.

2.Methadology



It is useful to characterize learning problems according to the type of data they use. This is a great help when encountering new challenges, since quite often problems on similar data types can be solved with very similar techniques. For instance natural language processing and bioinformatics use very similar tools for strings of natural language text and for DNA sequences. Vectors constitute the most basic entity we might encounter in our work. For instance, a life insurance company might be interesting in obtaining the vector of variables (blood pressure, heart rate, height, weight, cholesterol level, smoker, gender) to infer the life expectancy of a potential customer. A farmer might be interested in determining the ripeness of fruit based on (size, weight, spectral data). An engineer might want to find dependencies in (voltage, current) pairs. Likewise one might want to represent documents by a vector of counts which describe the occurrence of words. The latter is commonly referred to as bag of words features. One of the challenges in dealing with vectors is that the scales and units of different coordinates may vary widely. For instance, we could measure the height in kilograms, pounds, grams, tons, stones, all of which would amount to multiplicative changes. 2. Unsupervised learning In other pattern recognition problems, the training data consists of a set of input vectors x without any corresponding target values. The goal in such unsupervised learning problems may be to discover groups of similar examples within the data: it is called clustering.

Machine learning covers these areas:

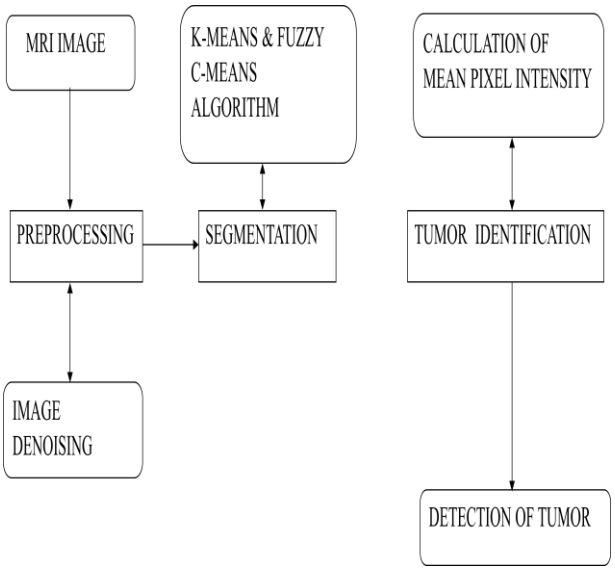
1.Classification assign a category to each object (OCR, text classification, speech recognition).

2.Regression predict a real value for each object (prices, stock values, economic variables, ratings).

3.Clustering partition data into homogeneous groups (analysis of very large data sets).

4.Ranking order objects according to some criterion .

3.Existing System



This project is divided into four stages. The first stage is a pre-processing stage for denoising the image, second stage is segmentation using hybrid approach i.e. K-means integrated with the fuzzy c-means, third stage consists of identification of tumor and the last stage is tumor detection.

Preprocessing: Initially preprocessing is done to improve the quality of image by denoising it. As generally the captured image is of poor quality, so filters are used for removing noise, sharpening and preserving edges and

smoothing defective images created by MR imaging system.

Segmentation: By de-noising the MRI image, the images are fed to KIFCM technique. The denoised images are fed to K-Means first and the clusters are formed according to K-Means. It is a simple clustering method and gives fast output as well, but contains false segmentation. After that the clustered image is fed to FCM. It is the clustering algorithm which allows one piece of data may be a member of more than one cluster.

Tumor identification:

Bone Tumor is identified by calculating the mean pixel intensity of the segmented image. The mean pixel intensity is based on the sum of the pixel intensities S for the extracted tumor part to the number of pixels N.

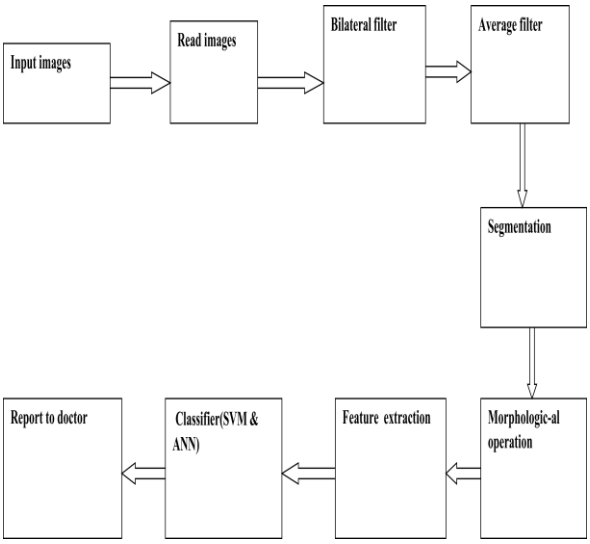
Tumor detection:

After identification of tumor the segmented tumor image contains small artifacts which can be removed by using the Matlab function for connected components. This function calculates the area of the entire segmented regions, the region with maximum area is considered and other regions are discarded.

5.PROPOSED SYSTEM

A tumor is an abnormal growth of new tissues that can occur in any of the body organs.In Recent years, there are many kinds of tumors in human body like brain tumor, bone tumor, lung tumor, etc.

Image processing plays a vital role in analysis and classification of tumor. Medical image processing is an important field of research as its outcomes are used for the betterment of health issues. Bone tumors develop when cells within a bone divide uncontrollably, forming a lump or mass of abnormal tissue.



There is a large class of bone tumor types which have different characteristics. There are two types of bone tumors, Noncancerous (Benign) and Cancerous (Malignant). In our project we can mainly concentrate on image segmentation for bone image and their classification.In the first module input image was segmented and the features are extracted, in the second module with the use of Support Vector Machine (SVM) and Artificial Neural Network(ANN) classifiers, the images are classified as Benign or malignant, and then trained image stored in database after that corresponding report should sent to automatically send to the server through IOT(Internet of Things) and doctor should access .This project proposed a simple and easy method to detect and classify the bone tumor.

4.Conclusion

This paper mainly discussed about the detection of the bone cancer. It can be further extended to identifying the stages of cancer.

The estimated number of new cases each year is expected to rise from 10 million in 2002 to 15 million by 2025, with 60% of those cases occurring in developing countries.This paper presents a formal mechanism for choosing mean pixel intensity values to discriminate between cancer/no-cancer for the images.The extracted segmented image is further processed to evaluate the mean pixel intensity in the region of interest. Based on the mean pixel intensity value thresholding, detection of the bone cancer is more accurately achieved.In this, the computer-aided diagnostic system the bone cancer from the CT scan images or MRI images is proposed and is also applicable for original formatof DICOM (digital imaging communication of medicine) medical images.

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