Diagnosis of Liver Diseases for MRI Image by using Abductive Image Analysis

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Abstract

Liver is vital organ in human anatomy. People are suffering from liver damage problems due to eating of polluted food, smoking tobacco or drinking alcohol. Main aim of this paper is to diagnosis for the damage of liver and predicting the future condition of patient's entire body by applying comparison concept [1] for existing images with by using Pixel values.In this paper we are collecting four different types of datasets after collecting the datasets first of all we are generating the grayscale images of all datasets. After generating the matrices of each and every grayscale image of all datasets. When we want to find out the position of a liver then collecting the 2D MRI Digital image. Next generating its matrix values through its grayscale image after that we are finding the similarities between the new image pixel values with existing images in datasets. When we are getting huge similarities between the existing images with new image then we are conforming the new image position.

Keywords; *MRI image, Grayscale image, pixel comparisons, Matrix generation*

I. INTRODUCTION

Liver is the tenth most common cause of death in India [9]. Liver sits on the right side of the belly. Liver contains the three significant parts [10] those are Left lobe, right lobe, and gallbladder. In Anatomy [10], the primary assignment of Liver is to channel the blood originating from the stomach related tract. Prior to passing it to the remainder of the human body. Due to polluted food, smoking and drinking of excessive alcohol, the liver damage will be happened.
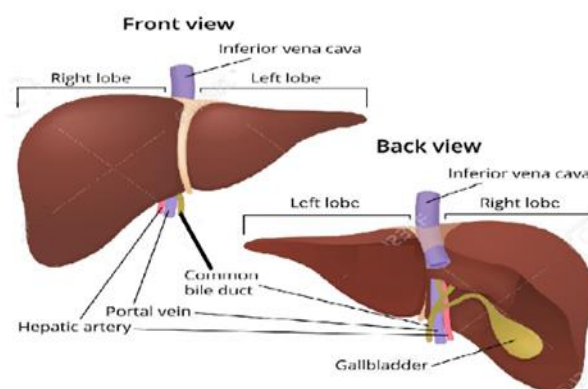

Figure 01: Anatomy of the Liver [11]

Mainly liver disease includes, Hepatitis, cirrhosis, liver cancer, liver failure, ascites, Gallstones, primary sclerosing cholangitis, hemochromatosis, primary biliary cirrhosis, Etc. To diagnosis of liver diseases like above mentioned, at basic level we have to apply blood tests at next step we have to do the ultra sound test, CT Scan Test, MRI Test, FMRI

Test, liver biopsy, liver and spleen scan test. We collected the dataset from CODALAB. We collected real time images and MRI images of liver data set from S-liver07 organization for our research work. We identified that the healthy Liver is in dark reddish color after getting any disease the liver is changing its color from dark reddish to different colors we demonstrated the progression of liver diseases [6] at different stages in the following figure 2.
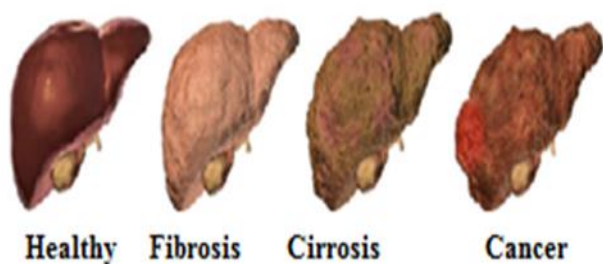

Figure 2: The Progression [6] of Liver disease

We can easily identify the difference between the MRI Images of healthy liver and different diseases livers in the following Figure 3
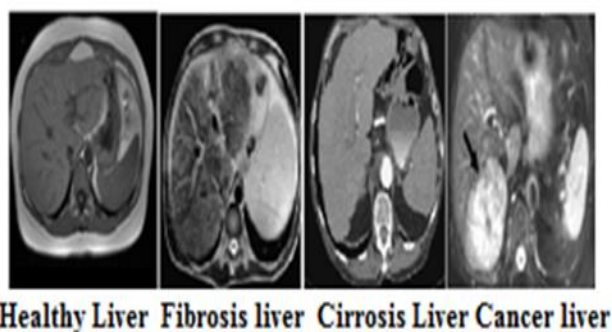

Figure 3: MRI Images of different disease images with Healthy liver image

II. ANALYSIS

In this paper we created a four different datasets those are taken from S-Liver 07 organization with the names of Healthy Data set, Fibrosis Data set, cirrhosis data set, cancer data set. We are creating gray scale images of each and every image of dataset and immediately we are generating a matrix values of all images in all dataset and storing all

matrix values in another datasets with the same name. Our main goal is to take new MRI liver image from unknown sources and find out the similarities [7] between the new unknown image with existing images from our datasets using Comparing similarities between two matrices by using subtraction of each and every image. if the results matrix value is most probable zero then we have to identify the new image's patients health problem.
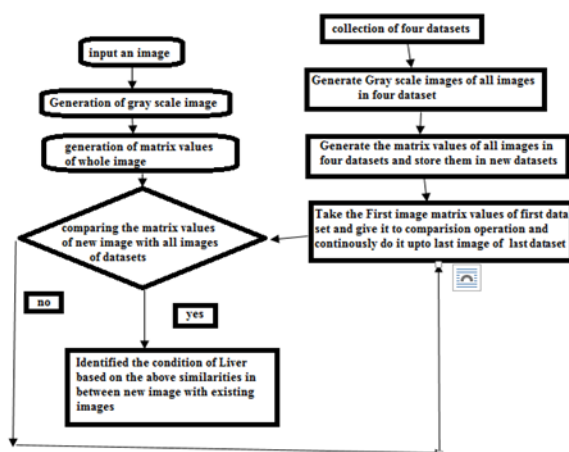

Figure 4: flow control of the Analysis

III.   CREATION OF DATASETS

We collected a datasets from S-Liver 07 organization we apply this concept on 100 images of each and every dataset. This concept can be applicable on limited number of images only. Each and every dataset [8] can be divided into three parts. Those are the age below 30, age above 30, age above 60.each and every dataset must be divided into two parts those are the Male part and Female part.

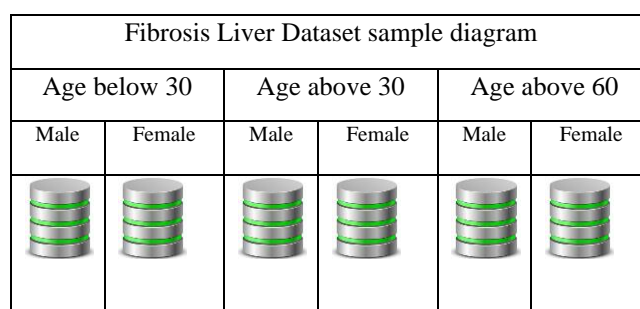| Fibrosis Liver Dataset sample diagram					
Age below 30		Age above 30		Age above 60	
Male	Female	Male	Female	Male	Female

Figure 5: Overview of the Dataset creation

Database creation is shown in the above diagram

similarly we have to create a datasets for healthy livers, cancer livers, cirrhosis livers and fibrosis datasets.

IV. GENERATING THE GRAYSCALE IMAGE

First of all we are taking an image as an input image. Next we are converting that 2D Digital image to gray scale image. In Figure 6 we given example for getting a pixel values for 2D Image. The following code is useful to getting a gray scale image from original image

```
I = imread('rice.png');

imshow(I(1:100,1:100)) %to show the first 100 pixels from the left top

figure, imshow(I) %Compare it with the entire image.
```

Figure 6: Sample Mat lab code for generation of gray scale image

Similarly like all images of in our all datasets (Healthy Dataset, Fibrosis dataset, Cirrhosis Dataset, cancer liver datasets). we are generating matrix values of each and every image and storing in our data sets. When we are getting a new image simply we are generating a matrix values of that image through its gray scale image and comparing the new matrix values with all matrix values of all images of all datasets if any image is matching the values of new image matrix values then we have to conclude that unknown image's patient have the disease that that was identified by the dataset
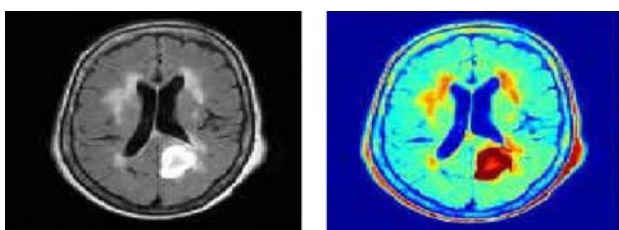

Figure 7: Conversion of 2D digital image to gray scale image

V. MATRIX GENERATION FROM AN IMAGE

We can get the matrix values of each and every Gray scale Image [5]by using the following

concept.The following figure demonstrates the matrix generation of an image.
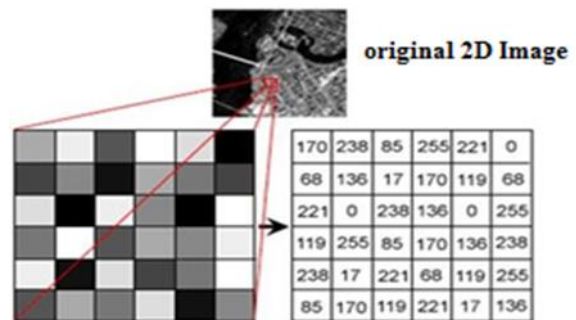

Figure 8: pixel values generation

we have to construct an matrix by using grayscale image in Matlab. The sample code of this concept is given below.

```
rgbImage = imread('peppers.png');
[rows, columns, numberOfColorChannels] = size(rgbImage)
imshow(rgbImage);
drawnow;

% Extract the individual red, green, and blue color channels.
redChannel = double(rgbImage(:, :, 1));
greenChannel = double(rgbImage(:, :, 2));
blueChannel = double(rgbImage(:, :, 3));

minR = min(redChannel(:))
minG = min(greenChannel(:))
minB = min(blueChannel(:))
maxR = max(redChannel(:))
maxG = max(greenChannel(:))
maxB = max(blueChannel(:))
for col = 1 : columns
  for row = 1 : rows
    message = sprintf('For row=%d, col=%d, diff = %.1f in the red, %.1f in the gr
      row, col,...
      redChannel(row, col) - minR, ...
      greenChannel(row, col) - minG, ...
      blueChannel(row, col) - minB);
    fprintf('%s\n', message);
  end
end
```

Figure 9: Sample code for generating matrix values from 2d-Digital image

Up to now we build a 4 different datasets those contains matrix values of 2d-Digital images through the grayscale image.When we want to finding out the present status of any new image then at the beginning we have to generate its matrix values of a pixel for entire image through its gray scale image next we have to compare the unknown new image matrix values to each and every image's matrix values of every dataset. If any image's matrix values are matching then we have to finalize the disease of the new unknown image by depending on the name of the dataset. If the image matrix values are matching with any image of healthy data set then we can finalize the new unknown image's patient have

healthy liver. If the image matrix values are matching with any image of Fibrosis Dataset then we can finalize the new unknown image's patient have fibrosis disease. If the image matrix values are matching with any image of cirrhosis dataset then we can finalize the new unknown image's patient have cirrhosis disease If the image matrix values are matching with any image of cancer dataset then we can finalize the new unknown image's patient have cancer disease.

VI. CONCLUSION AND FUTURE WORK

In this paper we constructed a databases with the names of its liver disease and generated all images of matrix values and stored it another database with healthy dataset, Fibrosis dataset, Cirrhosis dataset and cancer dataset.Taken new image and generated its matrix values from its grayscale image and then compared new image matrix values with matrix values of all images of each and every dataset. Finally if we identified any similarities between new image with existing image then we have to finalize the disease name. This approach show 95% success ratio comparing the existing methods. We can develop this idea for any part of MRI images of brain for finding the disease of body.

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