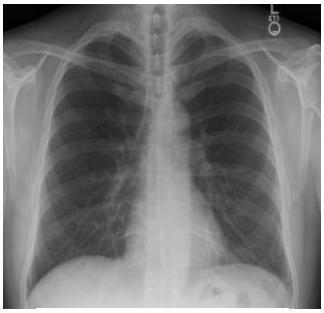


Figure 1: X-Ray image

2. **CT Images:-** Computed tomography, more commonly known as a CT or CAT scan, is a diagnostic medical test that, like traditional x-rays, produces multiple images or pictures of the inside of the body. The cross-sectional images generated during a CT scan can be reformatted in multiple planes, and can even generate three-dimensional images. These images can be viewed on a computer monitor, printed on film or transferred to a CD or DVD.

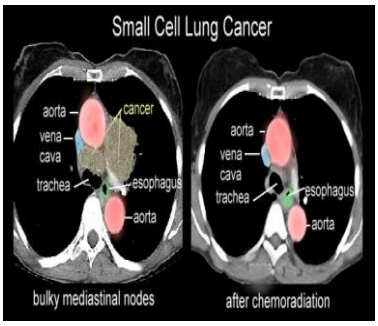


Figure 2: CT image

3. **MRI Images:-** Magnetic resonance imaging (MRI), nuclear magnetic resonance imaging (NMRI), or magnetic resonance tomography (MRT) is a medical imaging technique used in radiology to investigate the anatomy and physiology of the body in both health and disease. MRI scanners use magnetic fields and radio waves to form images of the body. The technique is widely used in hospitals for medical diagnosis, staging of disease and follow-up without exposure to ionizing radiation.

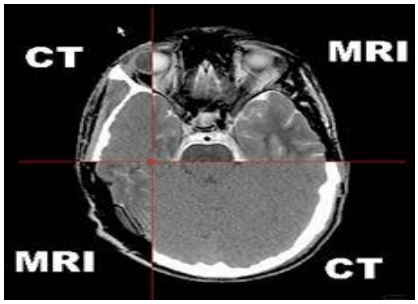


Figure 3: MRI image

4. **HRCT images:** - High-resolution computed tomography (HRCT) is computed tomography (CT) with high resolution. It is used in the diagnosis of various health problems. For example, HRCT of the lung is a medical diagnostic test used for diagnosis and assessment of interstitial lung disease. It involves the use of special computed tomography scanning techniques to assess the lung parenchyma.

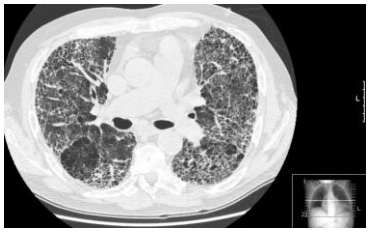


Figure 4: HRCT image

5. **Microscopic HRCT images:-**This is the type of HRCT images but these images are in the RGB format. These images can give better accuracy than other images [10].

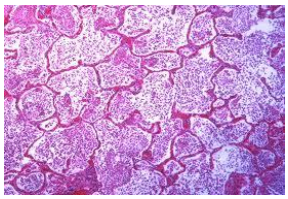
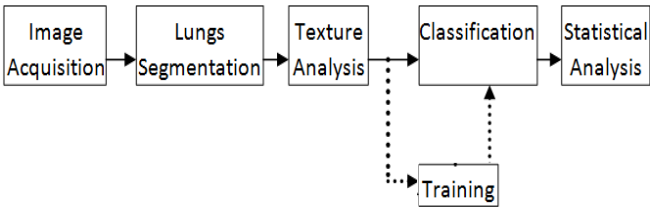


Figure 5: Microscopic HRCT image

4. System Development



Block Diagram

Figure 6: Diagram of the image analysis for the proposed method

Given a HRCT data set, the proposed automatic method first segment the right and left lung in three different sections, secondly it makes an analysis of the texture patterns and then a classifier is trained to distinguish between emphysema and no emphysema tissue. A statistical analysis is finally computed to assess the level of agreement between the results of the proposed method and the opinion of the experts.

4.1 Image acquisition

Image can be taken by two ways one is online and another is offline. In online image acquisition image is taken directly from machine or through internet. In offline image acquisition image is taken from database. After that we have to fix the size of image because sizes of input images are different.

4.2 Lungs Segmentation

Lungs segmentation is the important step in the method of lungs texture analysis. Depending on purpose of study there are different ways of lungs segmentation. In this firstly image is converted in from RGB to Grey image. Then we have to fix the size of image. Here we are using discrete wavelet transform (DWT) algorithm. In this algorithm image is divided into four parts Low- low, Low-high, High-low and High-high frequency component. Here we are considering only low-low frequency component [7].

Figure 7: Approximation component of image

Then feature components are calculated for the analysis and diagnosis of image that feature components are Entropy, Standard deviation and texture index.

1) Standard deviation:-It is the measure that is used to quantify the amount of variation of set of values
2) Entropy:-It is the grey level value on grey level plot of image. To calculate variation in grey level we use entropy.
3) Texture index:-It is the grey level intensity of the image[8].

4.3 Texture analysis and classification

In the texture analysis and classification values of standard deviation, entropy and texture index are considered. In classification of lungs disease fuzzy logic is used. In this image under process is compared with database images and correct disease is diagnosed [9].

5. Implementation

Figure 8: Input Image

Figure 9: Resized Image

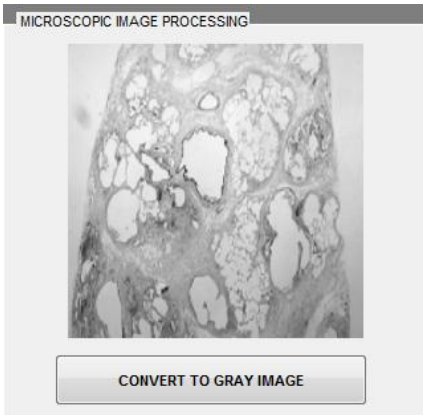


Figure 10: Gray image converted from RGB

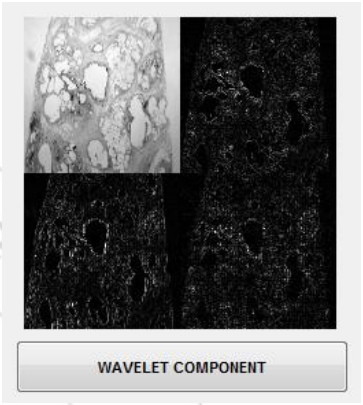


Figure 11: Extraction of Wavelet component

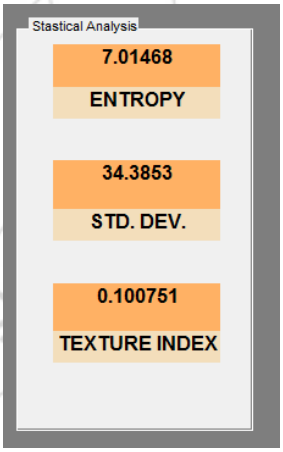


Figure 12: Statistical Analysis

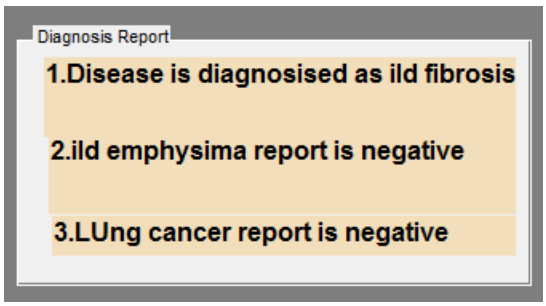


Figure 13: Diagnosis Report

6. Conclusion and Future Scope

We have implemented new method of texture analysis for lungs disease diagnosis. An automatic method of diagnosis

lungs disease is implemented in this paper. A HRCT image gives accuracy 70-80 percent but by using microscopic images we have increased accuracy to 90%. We have implemented fuzzy logic to classify the images so we get accurate results. This proposed method can be further improved by extracting more wavelet components to increase accuracy up to 100%.

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