Identification for liver fibrosis based on chronic HBV using Image inference

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ABSTRACT

Liver fibrosis is the formation of abnormally large amount of tissue in the liver. It occurs when the liver attempts to repair and replace damaged cells. Non-invasive assessment of severity of liver fibrosis is crucial for understanding histology and making decisions on antiviral treatment for chronic HBV [Hepatitis B virus] in view of associated risk of biopsy. The evaluation of relation between serum markers based on ultra sound images. It will detect accuracy and shows staging of liver fibrosis. To avoid the drawbacks of liver biopsy non-invasive method using machine-learning techniques was developed recently. In this paper image, information is also included in the dataset. For image information, the new algorithm was used that is ANFIS (Adaptive Neuro Fuzzy Inference System). In this concept, an approach has been taken to predict liver grades & what effects its severity.

Key words: Non-invasive assessment; Serum- markers machine learning; image interfering, liver disease severity;

I INTRODUCTION

The incidence of chronic liver disease (CLD) is high worldwide, and chronic hepatitis B (CHB) is an important cause of CLD [1]. Liver disease is one of most deadly disease. Liver is second largest organ of human body. In Liver fibrosis, a large amount of tissue is formed abnormally in liver. We can predict the severity of the liver disease and different treatments using liver fibrosis stage. At present Liver, biopsy is considered for assessing liver fibrosis. However, it has many drawbacks such as sampling errors; invasiveness complicated operating procedure and high costs [2]. The drawbacks will lead to occurrence of liver biopsy diagnosis & poor patient compliance. So safe & non-invasive methods to diagonalize the degree of liver fibroses is needed that may include serological diagnosis and image diagnosis [3]. The main functionality of liver is to remove the harmful toxics from the blood. If we cannot detect in early stage means it may lead to 3 types of hepatitis that is A, B and C. The liver disease in last stage means it cannot be recovered and it may lead to death. At stage of fibrosis, the functionality of liver stops working. In this proposed method is image diagnosis used to predict accuracy of liver fibroses accurately. In second section, we will discuss related work and existing system drawbacks. In third section explains proposed system and Methodology. Results are discussed in fourth section. Finally fifth section conclusion.

II RELATED WORK

In [4] Cerebral small vessel disease (cSVD) has a crucial role in lacunar stroke and brain hemorrhages and is a leading cause of cognitive decline and functional loss in elderly patients. Detection of cSVD is routinely carried out by key neuro imaging markers including white matter hyper intensities, lacunes, and small sub cortical infarcts, per vascular spaces, cerebral micro bleeds, and brain atrophy. Application of neural networking, machine learning and deep learning in image processing have increased significantly for correct severity of cSVD. A linkage between cSVD and other neurological disorder, such as Alzheimer's and Parkinson's disease and non-cerebral disease, has also been investigated recently. In Detection of cerebral small vessel, disease is routinely carried out by neuro imaging markers including brain atrophy where accuracy is 60% and 81.8% severity.

In [5] The data available in ICU, AISE algorithm can accurately predict the set of sepsis in an ICU patient 4 to 12 hours prior to clinical recognition using machine learning to improve clinical application. The high-performance models can be constructed to predict the onset of sepsis by combining data available from the EMR and high-resolution time series dynamics of blood pressure and heart rate they can predict septic shock with 85% accuracy using either EMR data or high-resolution vital sign streams.

In [6] Predicting patients Covid-19 disease severity by means of statistical and machine learning analysis of blood transcript to data showed accuracy and precision for this severity and mortality outcome predictions that were above 90%. Our work revealed several clinical parameters measurable in blood samples, which discriminated between healthy people and COVID-19 positive patients and showed predictive value for later severity of COVID-19 symptoms. Thus developed a number of analytic methods that showed accuracy and precision for disease severity and mortality outcome predictions that were above 90%.

In [7] Monitoring system proposed in this aims at helping CHF (congestive heart failure) stakeholders make appropriate decision in managing disease and preventing cardiac events obtained accuracy is 71.9% and severity 81.3% and implemented a Decision Support System (DSS) using machine learning (Random Forest algorithm) to predict the number of decompensations per year and to assess the heart failure severity based on a variety of clinical data. The obtained average accuracies are 71.9% in predicting the number of decompensations and 81.3% in severity assessment.

In [8] To predict or diagnosis of liver fibrosis and nonalcoholic fatty liver disease is liver biopsy. So, we systematically searched for studies in AI assisted. A recent meta-analysis evaluated 411 patients with biopsy-proven NAFLD from 11 cohortss studies (150 patients with NAFL and 261 patients with NASH). In the whole cohort, 33.6% of patients had fibrosis progression. This result was also observed in patients with NAFL but at a slower. Non-alcoholic fatty liver disease (NAFLD) is the most common liver disease in the Western world, with a prevalence of 20%. The early diagnosis of advanced fibrosis in NAFLD is therefore crucial, and it can be accomplished using serum biomarkers.

In [9] Data mining involves the use of mathematical science, statistics and machine learning to determine relationship between large sample of data, previously been shown, that data mining can improve prediction and diagnostic precision of type 2 diabetes millets. Random forest method was found to base prediction of chronic kidney disease. Machine learning methods have also been applied to assess new biomarkers and survival outcomes in patients with renal diseases to predict the development of chronic kidney disease, disease progression, and renal graft survival. In the latter, random forest, methods were found to be the best for the prediction of chronic kidney disease.

Existing System Drawbacks

- Occurrence of liver biopsy diagnosis.
- Serological model using simple indicators and formula.
- Costs more for biopsy diagnosis.

III PROPOSED SYSTEM

ANFIS (Adaptive Neuro Fuzzy Inference System) is an integration system in which neural networks are applied to optimize the fuzzy inference system. By using a hybrid learning procedure, the proposed ANFIS can construct an input output mapping based on both human knowledge & stimulated input output data pairs. ANFIS is the famous method, which combines the ANN (Artificial Neural Network) & fuzzy inference logic for non-linear methods. In fuzzy logic rule it adjusts the system for alteration for the exterior environment results the neural network system. For this model, it had learning ability in neural network, which has the abilities in fuzzy logic. The basic rule for ANFIS module is back propagation & gradient descent. It results single deviation & form final node to first node. In this concept image, information is also included to predict liver grades & severity of liver.

METHODOLOGY

Data collection: The patient data is collected from related to Indian patient record. By using this dataset, we can predict and evaluate the algorithms for reducing the burden on doctor.

ANFIS: ANFIS is the famous method, which combines the ANN (Artificial Neural Network) & fuzzy inference logic for non-linear methods. In fuzzy logic rule it adjusts the system for alteration for the exterior environment results the neural network system. For this module, it had learning ability in neural network, which has the abilities in fuzzy logic. The basic rule for ANFIS module is back propagation & gradient descent. By using random forests, the important attributes are selected to find the degree of liver stage and by using this random forest according to nodes, it is ranked. Along random forest, ANFIS by using this method it selects image that is related to all four stages and result will be displayed in form of edge detection after forming edge detection it also displays whether patients is suffering from liver or not. In this concept, image data is included to predict liver grades & severity of liver.

ANFIS ALGOTHIM (image interfering)

Step 1: Data preprocessing (Normalization [0, 1], outlier detection)

Step 2: Feature selection (information gain)

Step 3: Testing data 25%

     Else

Step 4: training data 75%

Step 5: Generate initial FIS (fuzzy interference system)

Step 6: Accepted performance

Step 7: Optimized FIS

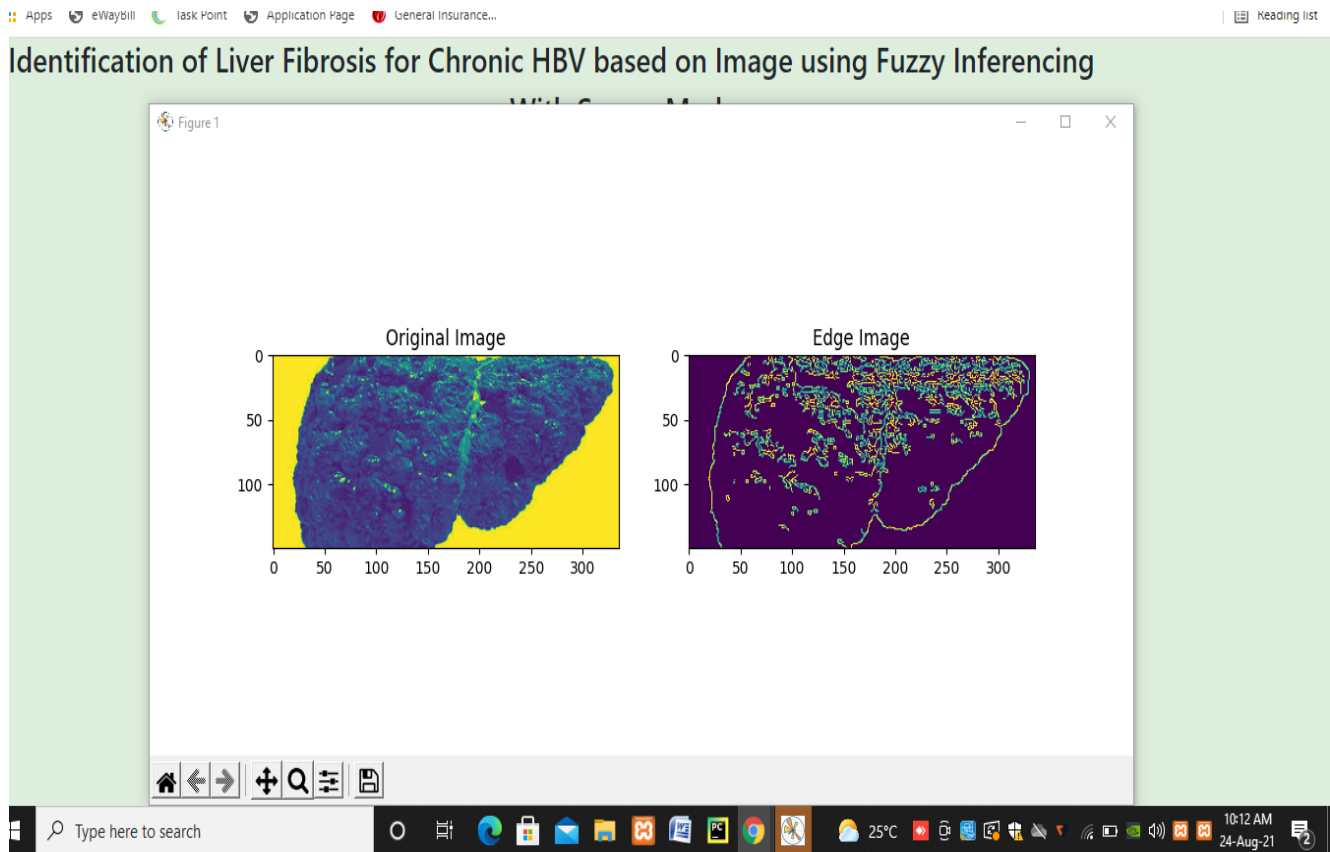Step 8: Absent, Mild, Significant or Cirrhosis.

IV RESULTS

Figure 1: Detection of edge image through fuzzy inferencing**.**

In the Above figure, original image is the actual image of the liver and Edge image represents the affected area of liver using Fuzzy algorithm.
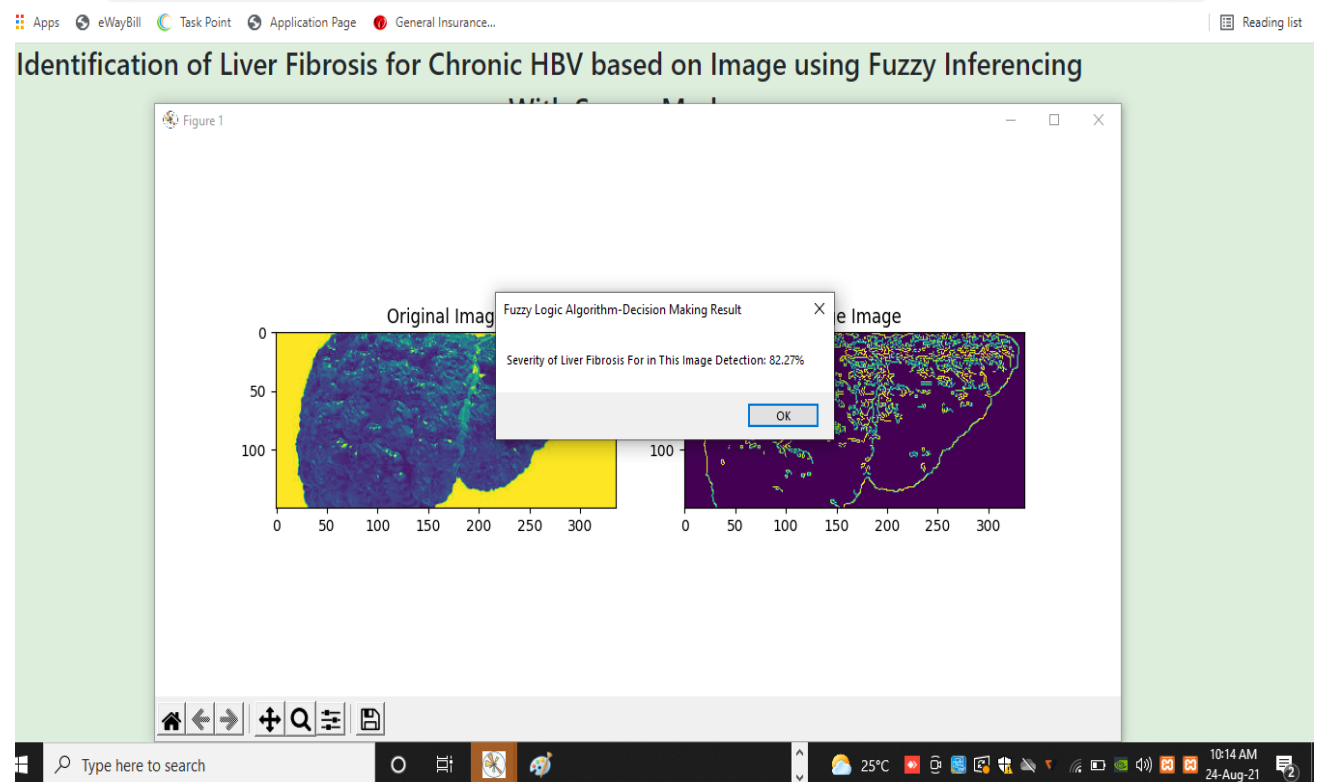

Figure 2: Image Detection

Above figure shows, the percentage of affected liver using fuzzy algorithm that is severity of liver fibrosis of this image detected 82.2% using fuzzy inferencing.

V CONCLUSION

We aimed to develop a computer-assisted assessment system for the evaluation of liver disease severity by using machine leaning classifier using image data. Our proposed work using image data identified 82.2% liver fibrosis. In view of health information including serum manufacturers and physical imaging data, future research is needed to improve the accuracy of the indicators and promote their clinical applications.

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