**LITERATURE SURVEY**

## 1) A Critical Study Of Selected Classification Algorithms For Liver Disease Diagnosis

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**and N. B. Venkateswarlu**

# Patients with Liver disease have been continuously increasing because of excessive consumption of alcohol, inhale of harmful gases, intake of contaminated food, pickles and drugs. Automatic classification tools may reduce burden on doctors. This paper evaluates the selected classification algorithms for the classification of some liver patient datasets. The classification algorithms considered here are Naïve Bayes classifier, C4.5, Back propagation Neural Network algorithm, and Support Vector Machines. These algorithms are evaluated based on four criteria: Accuracy, Precision, Sensitivity and Specificity. Classification techniques are very popular in various automatic medical diagnoses tools. Problems with liver patients are not easily discovered in an early stage as it will be functioning normally even when it is partially damaged. An early diagnosis of liver problems will increase patients survival rate. Liver disease can be diagnosed by analyzing the levels of enzymes in the blood. Moreover, now a day’s mobile devices are extensively used for monitoring humans’ body conditions. Here also, automatic classification algorithms are needed. With the help of Automatic classification tools for liver diseases (probably mobile enabled or web enabled), one can reduce the patient queue at the liver experts such as endocrinologists.

# 2) Prediction Of Different Types Of Liver Diseases Using Rule Based Classification Model

**AUTHORS:**  **Kumar, Yugal, and G. Sahoo**

# Diagnosing different types of liver diseases clinically is a quite hectic process because patients have to undergo large numbers of independent laboratory tests. On the basis of results and analysis of laboratory test, different liver diseases are classified. Hence to simplify this complex process, we have developed a Rule Base Classification Model (RBCM) to predict different types of liver diseases. The proposed model is the combination of rules and different data mining techniques.

# The objective of this paper is to propose a rule based classification model with machine learning techniques for the prediction of different types of Liver diseases. A dataset was developed with twelve attributes that include the records of 583 patients in which 441 patients were male and rests were female. Support Vector Machine (SVM), Rule Induction (RI), Decision Tree (DT), Naive Bayes (NB) and Artificial Neural Network (ANN) data mining techniques with K-cross fold technique are used with the proposed model for the prediction of liver diseases. The performance of these data mining techniques are evaluated with accuracy, sensitivity, specificity and kappa parameters as well as statistical techniques (ANOVA and Chi square test) are used to analyze the liver disease dataset and independence of attributes. Out of 583 patients, 416 patients are liver diseases affected and rests of 167 patients are healthy. The proposed model with decision tree (DT) technique provides the better result among all techniques (RI, SVM, ANN and NB) with all parameters (Accuracy 98.46%, Sensitivity 95.7%, Specificity 95.28% and Kappa 0.983) while the SVM exhibits poor performance (Accuracy 82.33%, Sensitivity 68.03%, Specificity 91.28% and Kappa 0.801). It is also found that the best performance of the model without rules (RI, Accuracy 82.68%, Sensitivity 86.34%, Specificity 90.51% and Kappa 0.619) is almost similar to the worst performance of the rule based classification model (SVM, Accuracy 82.33%, Sensitivity 68.03%, Specificity 91.28% and Kappa 0.801 and the accuracy of chi square test is 76.67%. This study demonstrates that there is a significant difference between the proposed rules based classification model and the model without rules for the liver diseases prediction and the rule based classification model with decision tree (DT) technique provides most accurate result. This model can be used as a valuable tool for medical decision making.

# 3) Prediction Of Liver Fibrosis Stages By Machine Learning Model: A Decision Tree Approach

# AUTHORS : Ayeldeen, Heba, Olfat Shaker, Ghada Ayeldeen, and Khaled M. Anwar

Using Information systems and strategic tools for medical domains is constantly growing. Automated medical models play an important role in medical decision-making, helping physicians to provide a fast and accurate diagnosis or even prediction. Making use of the knowledge or even in the early stages of knowledge acquisition, different statistical mining and machine learning tools can be used. For instance predicting whether the patient with Hepatitis C virus has also liver fibrosis or not is one of the concerns. In case the prediction result is true, in what stage is the fibrosis. To easily reach to this knowledge without costly diagnostic routine laboratory tests there should be a fully integrated system. Therefore in this study we used machine learning technique model based on decision tree classifier to predict individuals' liver fibrosis degree. Results showed that by using decision tree classifier accuracy is 93.7% which is higher range than what is reported in current researches with similar conditions.

# 4) A Survey On Classification Techniques In Data Mining For Analyzing Liver Disease Disorder

**AUTHORS** : **Sindhuja, D., and R. Jemina Priyadarsini**

Data mining is the process of extracting meaningful information from large database. In Medical field the problem may arise in the era data mining has vital role to predict and diagnosis the disease in early stage with the use of machine learning tool. Liver is the largest internal organ in the human metabolism plays an important role in human body and doing several vital functions. Liver disease may cause symptoms like Jaundice, Tendency to bruise, Bleed easily, Ascites, Impaired brain function, General failing health. The Liver disease is caused by the person who takes more alcohol in short time. Types of liver disease are Acute liver failure, Hepatitis, Liver Cancer, and Cirrhosis. In India many men’s were affected by liver disease disorder. This paper describes survey on classification techniques in data mining for analyzing liver disease disorder. Liver is the largest glandular organ of the body, it weights about 3lb (1.36kg). It is reddish brown in color and is divided into four lobes of unequal size and shape. The liver lies on the right side of the abdominal cavity beneath the diaphragm. The blood is carried out to the liver through two large vessels called the hepatic artery and the portal vein. Liver tissue is composed of thousands of lobules, and each lobule is made up of hepatic cells the basic metabolic cells of the body. Various types of stress and irregular eating habits as well as inhalation of alcohol and ongoing toxic gas, indigestion of contaminated food, excessive consumption of pickled food and drug intake, enables liver disease patients to grow up year by year.The person who cause by liver disease has some more symptoms they are dark urine, pale stool, bone loss, easy bleeding, itching, spider like blood vessel visible in the skin, enlarged spleen, fluid in abnormal cavity, chills pain from the biliary track or pancreas, and enlarged gallbladder. Alcohol abuse generally leads to three pathologically distinct liver disease they are fatty liver, hepatitis and alcoholic cirrhosis. One or all of the three can occur at the same time and in the same patient.

**5)** **Comparison Of Machine Learning Approaches For Prediction Of Advanced Liver Fibrosis In Chronic Hepatitis C Patients**

**AUTHORS**: **Hashem, Somaya, et al**

Background/Aim: Using machine learning approaches as non-invasive methods have been used recently as an alternative method in staging chronic liver diseases for avoiding the drawbacks of biopsy. This study aims to evaluate different machine learning techniques in prediction of advanced fibrosis by combining the serum bio-markers and clinical information to develop the classification models. Methods: A prospective cohort of 39,567 patients with chronic hepatitis C was divided into two sets-one categorized as mild to moderate fibrosis (F0-F2), and the other categorized as advanced fibrosis (F3-F4) according to METAVIR score. Decision tree, genetic algorithm, particle swarm optimization, and multi-linear regression models for advanced fibrosis risk prediction were developed. Receiver operating characteristic curve analysis was performed to evaluate the performance of the proposed models. Results: Age, platelet count, AST, and albumin were found to be statistically significant to advanced fibrosis. The machine learning algorithms under study were able to predict advanced fibrosis in patients with HCC with AUROC ranging between 0.73 and 0.76 and accuracy between 66.3 and 84.4 percent. Conclusions: Machine-learning approaches could be used as alternative methods in prediction of the risk of advanced liver fibrosis due to chronic hepatitis C.