

A Review on algorithms of Liver Disease Diagnosis

¹Rahul Sakharam Ishi, ²Mr. Vijay Birchha

¹M Tech scholar, ²Assistant Professor (Reader Scale)

Department of Computer Science and Engineering,

Swami Vivekananda College of Engineering, Khandwa Road, Near Toll Naka, Indore - 452 020 (M.P)

Abstract— Unlimited consumption of alcohol causes for rising of liver disease in patients, harmful gases in surrounding, eating of contaminated food, drugs and pickles also another reason for causing of liver disease. These algorithms are used to reduce work of doctors. These algorithms consider four criteria: Precision, Accuracy, Specificity and Sensitivity. The liver act as supporter of every organ of the body and require for survival. Liver disease not shows any symptoms initially or symptoms may not see goodly. Energy loss, weakness are some of the symptoms of liver diseases. Liver functional test is used to diagnose this disease. Number of techniques is used to detect the liver disease like ANN classification, Fuzzy techniques; data mining technique is also used. In this paper few of the techniques are discussed with advantage and disadvantage.

Index Term: Liver Diagnosis, Bayes classifier, Back Propagation

I. INTRODUCTION

Liver is the biggest interior organ in the human body, assuming a noteworthy part in digestion system and serving a few essential capacities e.g. deterioration of red platelets and so forth. Liver sickness is typically brought about by irritation or harmed hepatocytes, registers a diligent nearness on the rundown of main ten deadly illnesses in World. On the overall scale, live disease, or all the more particularly hepatocellular carcinoma (HCC), remains the third most regular reason for tumor related passing and the fifth-most successive malignancy with an expected 560,000 new cases each year. Characterization strategies are extremely famous in different programmed restorative conclusions instruments. Issues with liver patients are not effortlessly found in an early stage as it will be working regularly notwithstanding when it is somewhat harmed. An early analysis of liver issues will expand patient's survival rate. Liver illness can be analyzed by investigating the levels of compounds in the blood. Additionally, now a day's cell phones are widely utilized for checking people's body conditions. Here likewise, programmed grouping calculations are required. With the assistance of Automatic characterization instruments for liver ailments (presumably portable empowered or web empowered), one can decrease the patient line at the liver specialists, for example, endocrinologists. Liver capacity tests are a gathering of blood tests that can demonstrate how well a man's liver is functioning. LFTs incorporate estimations of egg whites, different liver compounds (ALT, AST, GGT and ALP), bilirubin, prothrombin time, cholesterol and aggregate protein. These tests can be performed in the meantime. Mean corpuscular volume- An ordinary quality in people is 27 to 31 picograms/cell. AST or SGOT (aspartate aminotransferase or serum glutamic oxaloacetic transaminase) AST (SGOT) is not just found in the liver. It is likewise ordinarily found in heart muscle, mind, and kidney tissue. Damage to any of these tissues can bring about a raised blood level. AST (SGOT) ordinary extent is 10-34 IU/L. Basic Phosphates (ALP) is a compound in the cells which line the biliary pipes of the liver. Snow capped mountain is likewise found in different organs including bone, placenta, and digestive tract. At the point when ALP is lifted, another test known as GGT (gamma-glutamyltransferase) can be requested by the specialist to affirm that the raised ALP is being gotten from the liver or biliary tract. ALP typical reach is 20-140 IU/L (worldwide units per liter). Gamma-glutamyl transpeptidase (GGTP) or transferase (GGT) Gamma-glutamyl transferase (GGT) is a catalyst which is valuable when contrasted with ALP. By looking at this two, it can be resolved if the patient has bone or liver malady. GGT or GGTP ordinary reach is 0-51 IU/L.

Sorts of liver illness The sorts of liver sickness incorporates Alcoholic Liver Diseases, Hepatitis, Acute Liver malady, Liver malignancy and so on., The accompanying demonstrates the sorts of liver ailment and its cause and conditions.

- Acute liver disappointment - Rapid decline in liver capacity - Drugs, poisons, an assortment of liver illnesses
- Hepatitis - Acute or perpetual liver aggravation - Viruses, liquor misuse, drugs, poisons, immune system, nonalcoholic greasy liver illness.
- Liver malignancy - A disease that begins in the liver - Increased danger with cirrhosis and interminable hepatitis; hepatocellular carcinoma (HCC) is most normal essential liver tumor
- Cirrhosis - Scarring of liver tissue prompts diminished liver capacity - Can be brought about by an assortment of conditions yet for the most part an aftereffect of incessant hepatitis, liquor abuse, or endless bile conduit impediment

Out of these sorts intense liver infections, hepatitis are more predominant in populace. The previous is happened because of liquor utilization and can be further ordered into two viz. Alcoholic liver infections and prompted liver sickness. Therapeutic examination has appeared with utilizing machine learning strategies for two decades. Learning of creation machine is helpful on therapeutic examination since it gives to lessening HR and their expense, and expands the precision of finding. The liver is a powerful organ at killing and ousting poisons from the body. In the event that the measure of poisons surpasses the organs working limit, cells of influenced regions in the organ will encounter cell harm. Some developing substances and catalysts will be discharged into the circulation system. While the patient is being analyze, proteins levels in the blood will be examined. Both lifted catalyst levels and the fluctuated impacts of various liquor levels on various patients can bring about wrong finding. This study is based on different approaches contemplated on the investigation identified with the liver wellbeing. The strategies are surely understood characterization and grouping calculations to discover the relationship between's the four diverse liver working tests, ALT, AST, Bilirubin Direct (BD) and Bilirubin Total(BT). The qualities are appropriate for the correaltion and this relationship can be helpful to automatically recognize sickness. Examples or fleeting checking of the liver illness status. Liver capacity tests are worked to give data about the patient's liver. The tests can be connected for a few reasons.

- Screening to distinguish the liver dysfunction
- Pattern of illness to perceive the kind of malady
- Asses seriousness to see how disjoin is the illness
- Follow up to monitor the liver illness.

The structure of this paper is sorted out as takes after Section 2 displays a thorough writing audit. Segment 3 gives the Problem dialog. Area 4 gives the conclusion. Following graph shows the people die due to liver diagnosis.

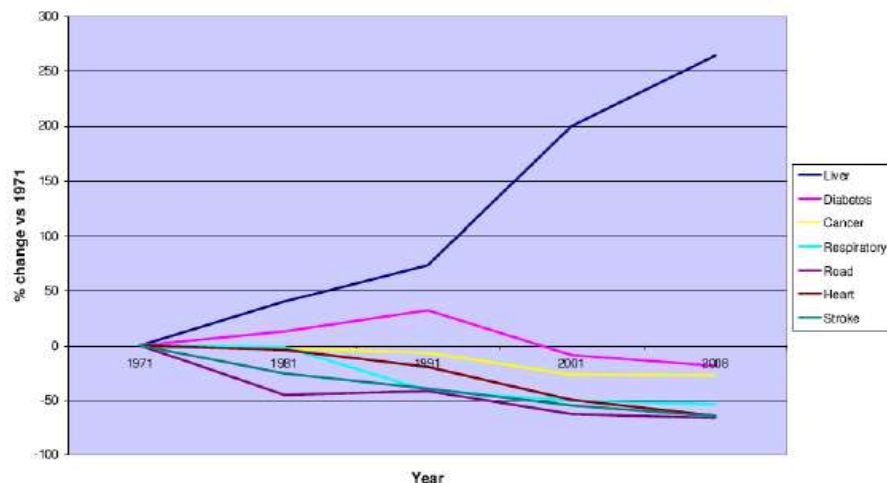


Figure Percentage of people died due to liver disease

II. LITERATURE SURVEY

1. Computed Tomography

Computed tomography (CT) pictures have been generally utilized for liver illness determination [1]. Outlining and creating PC helped picture preparing systems to help specialists enhance their analysis has gotten impressive hobbies over the previous years. In this system, a CT liver picture indicative grouping framework is displayed which will naturally discover, extricate the CT liver limit and further arrange liver illnesses. The framework contains a recognize before-concentrate (DBE) framework which naturally finds the liver limit and a neural system liver classifier which utilizes exceptionally outlined component descriptors to recognize typical liver, two sorts of liver tumors, hepatoma what's more, hemaoma. The DBE framework applies the idea of the standardized partial Brownian movement model to locate an underlying liver limit and afterward utilizes a deformable form model to unequivocally outline the liver limit. The neural system is included to arrange liver tumors into hepatoma and hemaoma. It is actualized by an adjusted probabilistic neural system (PNN) [MPNN] in conjunction with highlight descriptors which are produced by fractal highlight data and the dim level co-event framework.

Advantage: The proposed framework was assessed by 30 liver cases and appeared to be proficient and exceptionally viable.

Disadvantage: This system easily replace by another system with better advantage.

2. Ultrasound Image Analysis of Cirrhosis Liver Disease Using SVM Classifier

Symptomatic ultrasound is a valuable and noninvasive technique in clinical solution. Albeit because of its subjective, subjective and experience-based nature, ultrasound picture understanding can be impacted by picture conditions, for example,

checking recurrence and machine settings [2]. In this work, we exhibit a programmed liver cirrhosis conclusion framework utilizing ultrasound picture coordinating. Given an information picture, a preprocessing module is initially performed to channel spot commotion and recognize the to a great degree stable edge design which is characterized by a closeness capacity utilizing Hough change. Besides, a layout database is built to encourage the identification of district of hobbies and liver cirrhosis arrangement. At that point, bolster vector machine are utilized to test a gathering of 30 in-vivo liver cirrhosis pictures from 18 patients, and additionally other 30 liver pictures from 18 typical human volunteers. In this system, we have exhibited the strategy to develop a programmed framework for liver malady expectation. The commitments of the work include: (1) a preparation technique is proposed to improve the nature of clinical ultrasound pictures and to get the steady parameter for distinguishing the maximally stable edge design; (2) a programmed ROI discovery is displayed utilizing HT; (3) a versatile picture coordinating methodology is exhibited to foresee the likelihood of liver cirrhosis for a patient taking into account the patient database and the information ultrasound picture. At that point we proposed a picture order technique with surface components in view of SVM. From the trials results on high-determination aerial pictures, it has been demonstrated that this strategy can accomplish preferred results over customary pixel-based order technique with ghastrly data utilized as it were. The test results demonstrate that this technique is attainable and it can apply the ethics of both ghastrly and surface components

Advantage: The outcomes demonstrated that the bolster vector machine was 92.4% in affectability for liver cirrhosis (LC) while neural system gave 89.31 % in LC, and the framework was thought to be useful for clinical and instructive use.

Disadvantage: it is more complicated

3. Fuzzy Cluster Means System for the Diagnosis of Liver Diseases [3]

Liver sickness or confusion (LD) is a worldwide general wellbeing wonder that has kept on ascending because of instances of intemperate utilization of liquor, breathing in of unsafe gasses, admission of debased nourishment furthermore, medicates. The malady results in liver decay because of consequent substitution of liver tissues by sinewy scar tissues making it lose its capacity to control the metabolic exercises of the blood and digestive framework. The manifestations rely on upon the sort and degree of the illness and may incorporate; delayed sentiments of weariness, loss of craving (anorexia), queasiness, swollen legs (edema), weight misfortune, stomach torment and bloating because of liquids gathering in the belly of patients (ascites). The infection is analyzed based on the liver practical tests (LFT) and clinical side effects. In this system they introduce a Fuzzy group implies (FCM or fluffy C-Means) model for the investigation of blood egg whites and clinical manifestations to distinguish liver issue. Utilization of bunch investigation includes an arrangement of methodological and logical choice steps that upgrades the quality and importance of the bunches delivered. The vulnerabilities regularly connected with investigation of LFT test and clinical information is dispensed with by the proposed framework. Notwithstanding the consistent progression in the field of medicinal sciences, analysis of malady remains a testing assignment. Liver illness specifically is not effectively found at its underlying stage; early conclusion of this driving reason for mortality is along these lines exceedingly essential. As a part of the continuous endeavors to make analysis more viable, this concentrate likewise built up a fluffy bunch implies framework to bolster the conclusion of liver issue utilizing an arrangement of clinical signs and side effects with LFTs. The grouping, confirmation and coordinating of side effects to the five gatherings of bunches was fundamental particularly in some unpredictable situations. This model takes into consideration the order of what's more, coordinating of bunch gatherings to liver ailment side effects.

Advantage: This work exhibits the down to earth use of delicate registering in the area of demonstrative design evaluation by deciding the degree of enrollment of singular indications.

Disadvantage: The trial results demonstrate that the proposed model can move forward the nature of LD diagnostics.

4. Disease Diagnosis using Soft Computing Model

A great deal of exertion has been committed to make the analysis framework more responsive, strong, and easy to use for non-aptitude. From writing audit, author discovered a percentage of the issues still exist in the proposed finding frameworks that are specified in inadequacies. Obscure symptomatology still exists in the present conclusion framework that is not ready to portray liver illness. Framework is missing measurable apparatuses in the preprocessing of preparing information or manifestations which makes framework excessively troublesome, making it impossible to comprehend the non-master doctor. Disregarding the progression in the field of restorative sciences, determination of sickness remains a testing errand. Liver ailment specifically is not effortlessly found at its underlying stage; early conclusion of this driving reason for profound quality is along these lines exceptionally imperative. As a part of the progressing endeavors to make conclusion more powerful, this concentrate in like manner built up a two-stage clever determination model planning to give an extensive scientific system to raise the exactness of liver finding.

Advantage: In the finishing up stage, Rule extraction is enhanced the precision.

Disadvantage: In grouping stage, MLP is utilized to recognize sound liver and infected liver.

5. K-Nearest Neighbor Algorithm

K-Nearest neighbor calculation (KNN) is one of the regulated learning calculations that have been utilized as a part of numerous applications in the field of information mining, factual example acknowledgment and numerous others. It takes after a technique for grouping objects in light of nearest preparing illustrations in the highlight space. An item is grouped by a lion's share of its neighbors. K is dependably a positive number. The neighbors are chosen from an arrangement of items for which the right characterization is known. The K nearest neighbors' calculation is as per the following [6]:

1. Decide the parameter K i.e., number of closest neighbors heretofore.
2. Separation between the inquiry occasion and all the preparation tests is ascertained utilizing any separation measure calculation.
3. Separations for all the preparation tests are sorted and closest neighbor in view of the K-th least separation is resolved.
4. Since the K-NN is administered learning; get every one of the Categories of your preparation information for the sorted quality which falls under K.
5. The forecast worth is measured by utilizing the dominant part of closest neighbors.

Advantage: Result quality is good

Disadvantage: it requires more time

6. Soft Computing technique for Disease Diagnosis

This system gives an audit of various delicate processing strategies in finding and discovery of aforementioned issue intensity [7]. The review is completed for three diverse sorts of information of various illnesses with cross approval and rate split for testing new information sets of each. The outcomes show that Rough Set Theory gives greatest precision and scope range however with most extreme computational time many-sided quality. Then again Neural and Bayesian Network give entirely pleasant results. Besides the got comes about additionally recommend that precision relies on upon the nature of standardization of data. From the examination it is reasoned that, delicate registering knowledge systems assumes a noteworthy part in sickness arrangement and forecast. Unpleasant Set gives high precision yet additional time necessity for standardized information. In any case, Neural Network and Bayesian Classifier are generally utilized today for their extraordinary precision, scope region and less time prerequisite. Choice Tree is straightforward however given less exactness. The grouping exactness can be enhanced by decrease in components. Despite heaps of others hybridized knowledge methods, master framework, enhancement systems are under examination to enhance the precision, these procedures are most ordinarily utilized for order with adequate exactness for medicinal analysis and different calculations are under exploration which will enhance the proficiency of these methodologies. Covering side effects of liver ailment makes the suspicious remedy for a specialist those expansions odds of other perpetual ailments. Because of absence of institutionalized indicative measures, an appropriate analysis remains frustrated. In specific, it empowers us to propose a demonstrative framework that distinguishes covering side effects of the infections. The result of the proposed work will be a classifier which takes in a set of side effects to be broke down for a specific infection and the result would be to effectively close whether the test is covering or non-covering side effects, if infected then the sort of the sickness. The reason of this work is pre examination of a patient's side effects for the claim of an infection and its sort, before reception of drug under a doctor's supervision [8].

Advantage: This work will absolutely spare valuable time and exertion of doctors and will convey to an end sufferings of unhealthy individuals sitting tight for analysis.

Disadvantage: Most Extreme time required for computation.

7. ANN Technique for Liver Disease Diagnosis

Artificial Intelligence (AI) is worried with the configuration of keen PC framework and now it is not new in exploration field- Artificial Neural Network is one of the viable computational demonstrating apparatus in AI systems. In cutting edge period ANN concentrated upon numerous intricate issues like example acknowledgment, anticipating, control framework which have been a genuine worry in numerous mechanical applications. Amid the most recent two decades ANN is considered as one of the real innovation in delicate processing and fundamentally been utilized as a part of therapeutic applications and examination in malady determination framework. It is surely understood that ANN have been persuaded from organic sensory system and mind structure, has the ability to learn and get information to take care of the unpredictable issue. Neural Networks (NN) comprise of profoundly interconnected neural registering components that have the ability to sum up, can anticipate new results and process the data simply like a human mind performs[9]. Neural Networks essentially comprises of three layers in its design: First layer is known as the information layer which gets the info signals from outside world: Second layer otherwise called middle person layer or concealed layer performs calculations as indicated by the capacity gave: and the last layer known as the yield layer, produces the yield in the wake of accepting the yield signal[10]. Through these layers information or learning is spread and are put away as the synaptic weights between the neurons. There are diverse sorts of Neural systems accessible however Multilayer Neural Network or Multilayer Perceptron(MLP) utilizing Back spread algorithm[11] are the most well known in today's world as it comprise of different shrouded layers which helps in taking care of complex issues and has a decent application potential. In such manner, in light of some helpful qualities of Neural Network like adaptation to non-critical failure, speculation and the capacity to gain from the earth Artificial Neural Network has been effectively executed in

different controls furthermore turned into a mainstream device for infection finding framework. In this appreciation, by checking on different articles we have seen countless courses by which ANN is hindering the determination of various sicknesses. ANN has as of late been executed in diagnosing Alzheimer's sickness. Alzheimer's infection is one of the neuro-degenerative turmoil in which the passing of the cerebrum cells causes memory misfortune and intellectual decays. The general population matured above 65 basically experiences the ill effects of this ailment. Shih-Tnig Tang et al. [12] displayed a PC helped finding to examine and distinguish the volumetric and shape components of hippocampus identified with Alzheimer's sickness. Standard Component Analysis (PCA) and Back spread Artificial Neural Network calculation was used in this work for the element grouping. The division and ID included confused information and along these lines tedious however ANN substantiated itself a testing apparatus for the determination of this sickness and accomplished an exactness of 92.17%. In reference to the creators displayed a similar investigation of the mid-section malady utilizing MLP, Learning vector enhancement and summed up relapse. S.Karthik et al. proposed a technique in diagnosing the liver sicknesses like hepatitis, cirrhosis, liver tumor by utilizing ANN and Multilayer Perceptron (MLP) algorithm [13]. Y.Unal et al. in 2011 made an examination on [14] wavelet based ANN to analyze intervertebral degenerative plate sickness. If there should arise an occurrence of this illness the liquid which goes about as a safeguard gets diminished. Conclusion of this ailment turns out to be more intricate and tedious if done by traditional techniques furthermore odds of naiveté and wrong finding can be conceivable. So to keep these inconveniences highlight vectors were gone as a data to the MLP and MRI (Magnetic Resonance Imaging) is utilized to distinguish the degenerative pictures of the intervertebral circle.

Advantage: Good Result as Compared to Soft Computing Model

Disadvantage: The creators presumed that the proposed finding framework goes about as the supporting instrument for the radiologists and can be enhanced further.

8. Fuzzy Technique for Liver Disease Diagnosis

Among all delicate processing methods Fuzzy Logic (FL) likewise looks like human basic leadership and has the ability to handle vulnerability, imprecision and inadequate data. In true, fluffly rationale helps in taking care or the like of issue by breaking down the past and foreseeing the future [15] which can be executed in both equipment and programming. The utilization of fluffly rationale critical thinking strategy has been shown and explained by the specialists so that the traditional methodologies of critical thinking because of absence of data can be settled [16]. One of the principle uses of the fluffly rationale is Fuzzy Expert System (FES) which contains fluffly rationale to acknowledge the uncertain information and gives a careful yield. It can work from rough thinking and can give at last an exact answer for the given issue. The unmistakable elements that separates Fuzzy master framework from other scientific models are:(a) it can co-work with heuristic knowledge,(b) Initiates master critical thinking by aggregating or assembling background and skills(c) capacity to manage dubious, obscure, equivocal information. In admiration to these attributes, FES has caught an unlimited range in mechanical applications as well as in therapeutic conclusion. While trying to conquer the impediments of the customary PC helped analysis, for acquiring proper restorative data required for the therapeutic experts FES has been picked as a capable instrument for diagnosing distinctive sorts of illnesses. Principally master frameworks assumes an essential part in those regions where experienced and talented specialists are constrained or not promptly available [17].Almost each restorative associations is growing an exceptional intrigue and anticipating these master frameworks for the perfection and powerful malady finding. The procedure behind diagnosing the maladies utilizing fluffly rationale includes certain stages: (1) Fuzzification of the information variables like signs, indications, clinical information and so forth. (2) Generating fluffly standard base (3) The fluffly induction motor forms a basic leadership rationale in light of the fluffly tenets (4) Defuzzification of the produced yield to fresh values. In one of the system the late utilization of FES for the determination of various sorts of illnesses has been inspected and contemplated furthermore led an audit with respect to the use of various fluffly apparatuses and calculations utilized. In [18], creators composed a fluffly master framework for the analysis of the coronary illness. In this outline Mamdani Inference strategy was utilized. 13 properties were taken as info variables and a solitary yield variable was alluded to the nearness of the coronary illness in the patient. The outcome acquired was right to 94% when contrasted with Cleveland Foundation database. In 2012, Nidhi Bhatla et al. performed coronary illness analysis by diminishing the quantity of properties and the quantity of tests embraced by the patients. Choice tree and Naive-Bayes utilizing fluffly rationale was utilized [19]. Vishal Chandra et al. [20] utilized technique for the improvement of an electronic fluffly master framework for the administration of the hypertension utilizing fluffly rationale approach. A few characteristics like systolic circulatory strain, diastolic pulse, age, body mass are taken as inputs.

Advantage: This technique provides result in quick time and easy to understand.

Disadvantage: For working of this algorithm more input parameters required.

III. CONCLUSION

In this study, prominent Classification Algorithms were considered for assessing their order execution as far as Accuracy, Precision, Sensitivity and Specificity in ordering liver patients dataset. Exactness, Precision, Sensitivity and Specificity are better for the AP Liver Dataset contrasted with UCLA liver datasets with all the chose calculations. This can be credited to more number of helpful qualities like Total bilirubin, direct bilirubin; indirect bilirubin, Albumin, Gender, Age and Total proteins are accessible in the AP liver dataset contrasted with the UCLA dataset. The advantage and disadvantage of this

technique are discussed with this study. The entire algorithm are providing good result but lacking in some of the points. Because of all this discussion it becomes necessity to study liver diagnosis. In the future proposed system first the two techniques are compared for the liver disease diagnosis and then this two techniques are combined together to produce the more accurate result with quick time.

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