Analysis of Liver Disease Prediction Methods and Future Research Directions

P. Sylvia[1], K. Priyadharshini[2], A. Praveen[3], R. Sivaramakrishnan[4]
[1,2,3]UG Scholar, [4]Assistant Professor
Department of CSE, KPR Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India

***Abstract* – The liver is an indispensable organ in people's body. It is an extra stomach related organ which helps the breakdown of fat. No choices are found to make up for the nonattendance of liver capacity, however, liver dialysis strategies can be utilized for momentary treatment. At an Early stage, It is hard to Diagnose and foresee liver sickness. A few research works have been completed in the past to analyze liver sickness and its expectation in beginning periods. In this paper, we displayed a point by point investigation of late research works in the region of liver ailment analysis and forecast utilizing different strategies. Besides, we featured the difficulties, open issues, and execution contemplations for future research in liver ailment analysis and forecast.**

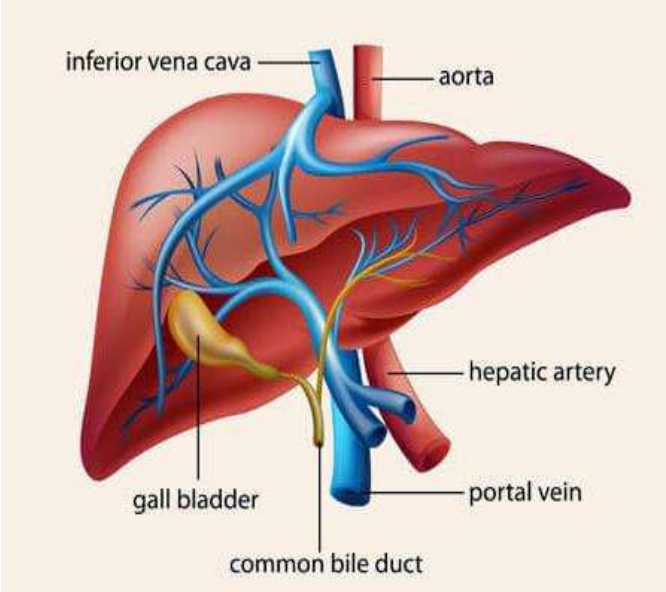
***Keywords*– liver, RNN, cirrhosis, deep learning, patients**

I. INTRODUCTION

Deep learning is a way of gaining knowledge of that takes place while computer systems discover ways to recognize styles and classify matters using raw, unlabeled information (unsupervised mastering) as opposed to the assignment-unique algorithms of preferred neural networks that depend completely on supervised learning.Deep learning techniques can carry out each unsupervised and supervised learning. The function feature of the neural networks underlying these models is multiple hidden layers, for this reason the time period "deep learning".Because real-global facts which includes snap shots, video, and IoT sensor records are generally unstructured and not convenient to process, deep learning to know fashions meet the need of getting computers to learn autonomously through coming across feature features of facts the usage of special algorithms.The elements of cutting-edge technology that facilitate deep learning include the provision of large-scale datasets, cheaper get right of entry to to rapid pictures processing gadgets (GPU) that can swiftly carry out mathematical calculations, and advanced training algorithms.

The liver is the biggest organ in the human body. It weighs around 3 lb (1.36 kg). It is rosy dark colored in shading and is partitioned into four projections of unequal size and shape. The liver lies on the correct side of the stomach cavity underneath the stomach. It processes the dinners, store the vitality and put off the toxic substances. In medicinal term, Liver disease is an affliction that prevents the liver from the working. By 2025, India is anticipated to end up being the World Capital for Liver Diseases. There are numerous styles of liver disorders which can be because of infections and a lot of medication use. The essential signs and side effects of liver malady incorporate a developed liver and swollen belly, queasiness, heaving, weight decrease, and exhaustion. A portion of the components which blast the opportunity of the liver ailment are recorded under:

- Family records of liver issue
- Smoking
- Liquor utilization
- Admission of more noteworthy polluted dinners
- Stoutness
- Diabetes



There are different arrangements had been progressing for diagnosing and expectation inside the territory of machine considering and profound breaking down of calculations. Some of them are K*, SVM, Decision tree, Logistic relapse, CNN, etc.., however no longer in RNN. So we will prompt the rendition that is finished with the guide of utilizing RNN that is utilized to analyze and forecast of liver disorder.

The essential objective of these investigations is to utilize neural systems to analyze and end up mindful of liver patients from sound individuals. In this watch, Recurrent Neural Network was considered and assess its general execution precision with the present model to uncover RNN execution is additional than the elective styles. Further, the RNN show is executed as an easy to understand Graphical User Interface (GUI) utilizing the Tkinter bundle in python. This GUI might be helpfully misused with the guise of medical specialists as an instrument for diagnosing and anticipating the liver ailment.

The dataset applied is the Indian Liver Patient Dataset (ILPD) which became obtained from https://www.Kaggle.Com/uciml/indian-liver-affected person statistics for this examination. These statistics set contains 416 liver patient information and 167 non-liver affected person information amassed from North East of Andhra Pradesh, India. The "Dataset" column is a category label used to divide agencies into the liver affected a person (liver disorder) or no longer (no disease). These statistics set includes 441 male affected person statistics and 142 girl affected man or woman data.

The remaining portion of the paper is organized as follows: Common liver disorders in section 1. Stages of Liver Disease Related works are discussed in Section 3. Section 4 gives the conclusion.

II. COMMON LIVER DISORDER

Fatty liver (also known as steatorrhoeichepatosis or steatosis hepatitis) is a reversible condition in which large triglyceride fat vacuoles accumulate in liver cells through the steatosis procedure. It can occur in humans with a high level of alcohol intake, in addition to individuals who have no alcohol. Hepatitis (generally caused by a virulent disease spread by means of sewage infection or direct contact with inflamed frame fluids).

Liver cirrhosis is one of the most extreme liver diseases. It is a condition used to indicate all varieties of liver diseases characterized by large cell loss. The liver shrinks gradually and becomes leathery and difficult. The regenerative hobby keeps under liver cirrhosis, but the progressive absence of liver cells exceeds mobile substitution.

The risk of liver cancer is better in individuals with cirrhosis or with positive varieties of viral hepatitis; but more often, the liver is the website of secondary (metastatic) cancers from other organs.

III. STAGES OF LIVER DISEASE

Stage 1: Moderate fibrosis without frightening walls.
Stage 2: Moderate to moderate fibrosis with scarring partitions.
Stage 3: Bridging fibrosis or scarring that has developed into one part of the liver in all types, but without cirrhosis. *Stage 4*: Cirrhosis or intense scarring.

IV. LITERATURE REVIEW

Literature or a narrative assessment is a kind of review article. A literature overview is a scholarly paper that includes the current know-how, including substantial findings, as well as theoretical and methodological contributions to a specific subject. Critical literature is secondary and no longer files new or original experimental paintings.

Jacob et Joel. Al[1] predicted the use of machine gaining knowledge of algorithms for liver disease. The data set used in the UCI repository is the Indian Liver Patient Dataset. They used logistic regression algorithms, SVM, KNN & ANN. ANN was the model which resulted in the highest precision with a precision of 92 percent. Compared to the opposite algorithms, ANN has been shown to be quite green to predict hepatic disease.

Vijayarani et. al [2] Liver disease was expected to use data mining. The Liver Function Data Set (LFT) is used. They used statistical mining algorithms made up of the Naïve Bayes Vector Machine type & support. They conclude that the SVM classifier is the excellent classifier for predicting hepatic disease due to its maximum accuracy.

B.Sarithaet. al [3] A new algorithm was proposed to classify and detect liver sickness with the help of a data set. This algorithm is called an Algorithm for separation. The LFT (Liver Function Test) statistics set, which is acquired with the help of "MEDCIS PathLabs India Private Ltd. ", Hyderabad. This approach diagnoses the liver disorder with an accuracy of 85.1 percent and the total time taken to complete the training is 1 2d and 1 second on a laptop is tested.

Ebenezer Obaloluwa Olaniyiet. al [4] They have developed a neural network fashion for diagnosing liver disease. The two modes of neural networks are therefore the backpropagation and the radial base function. These structures have developed the use of the data set for BUPA liver disease from the UCI gadget mastering repository. They examine & conclude with the previous research to prove that the radial foundation version is the fine model for diagnosing the liver disease with 70 percent accuracy.

Sajjad Waheedet. al [5] Uses the classification algorithms for diagnosing hepatic disease. Many classification algorithms are used, including Bagging, K*, Naïve Bayes, logistics and REP tree. These two UCLA and AP data units were designed to determine the pleasant set of rules. Amongst these numerous rules, they assess that the K* set of rules is the fine set of rules for diagnosing the liver disease.

Ferdous Araet. al [6] Uses the set of rules used to expect liver disease from numerous trees of choice. The records are collected from the UCI Machine Learning Repository and expect liver disease based primarily on the attributes given. J48, LMT, Random Forest, Random Tree, REPTree, Decision Stump and Hoeffding Tree are the different tree algorithms of choice. Finally, they evaluate and conclude that the Decision Stump is the high-quality selection tree set of rules for maximum accuracy of liver disease.

Mohammad Khaleel Sallam Ma'aitah et. al [7] Designed a smart liver problem model based primarily on fuzzy neural models. They used datasets extracted from a repository (UCI). Comparison of the results of the version with research conducted by different researchers with one kind of system studying tactics in the same set of statistics shows that this proposed set of rules is extremely efficient and can be recommended for radiologists to diagnose liver disease.

Yugal Kumar et. al [8] A version has been proposed that the use of records-mining techniques with k pass area technique is expected to include unique types of liver disease. They used the UCI repository 's dataset. The mining strategies of facts are SVM, RI, DT, NB. The overall performance of these facts mining strategies evaluated with certain parameters such as accuracy, specificity, Kabba and so on, comparing one's information mining techniques with the individual parameters, proved that the version with choice tree technique offers extra accuracy than the other strategies with ninety-eight accuracy.

Prof. M.Surendra Prasad Babuet. al [9], The use of the selected classification algorithms was expected to cause liver sickness. They used two distinctive datasets, one from India's Andhra Pradesh country and one from BUPA liver disease datasets. In this 10-go fold validation, selected algorithms can be compared. The classification algorithms selected are C4. Five, Naïve Bayes, SVM, K nearest neighbor & Algorithm for backpropagation. They conclude that the selected classification algorithms are better in the AP data set compared to the BUPA liver data set using some parameters such as accuracy, specificity, precision, and sensitivity.

G.Seenuvasan et. al [10] has predicted the liver sickness at an early degree by using a classification algorithm in order to locate which classification algorithm is the first-rate set of rules. This observation analyzed algorithms which include C4. Five, Naive Bayes, Decision Tree, Support Vector Machine, Back Propagation Neural Network, and Classification and Regression Tree Algorithms. Finally, they conclude that the C4.5 offers higher consequences than the other category algorithms.

Zi-Yong Xu et.al [11] has developed a version to assess the efficiency of radiation prediction triggered by a liver disorder using the Artificial Neural Community technique. They applied a total of ninety-three patients with liver carcinoma (PLC) number one. Finally, they conclude that the synthetic neural network gives the prediction of radiation precipitated in a liver disease excessive accuracy.

Dhamodharan et.al [12] Expected 3 major liver diseases along with most liver cancers, cirrhosis, and hepatitis with distinct symptoms. Naïve bays and FT Tree algorithms were used to predict diseases. Comparison of these algorithms was carried out based on the measurement of class precision. From the experimental results, the Naïve Bayes was concluded as the higher set of rules that expected diseases with maximum type accuracy than the opposite set of rules.

Rosalina et al [13] Hepatitis prognosis is expected to affect the use of the Support Vector Device (SVM) and the Wrapper Method. They used wrapper methods to discard noise capabilities before typing. First, SVM performed a function selection to achieve better accuracy. Features were selected to minimize noisy or irrelevant information. From the experimental results, the increased price of accuracy in the medical laboratory looks at a fee with minimum execution time. They achieved the goal by combining the Wrapper Method with the SVM strategy.

Omar S. Soliman et al [14] Modified Particle Swarm Optimization Algorithm and Least Squares Support Vector Machine (LS-SVM) have proposed a hybrid category system for HCV diagnostics. Feature vectors extracted the use of the main algorithm for analysis of the components. Since the LS-SVM set of rules is sensitive to the adjustment of the values of its parameters, the Modified-PSO algorithm is used to find the most useful values of the LS-SVM parameters in a much less wide range of iterations. The proposed device is applied and evaluated at the HCV statistics benchmark set from the UCI repository for system acquisition of database knowledge. It is compared to some other type of machine that used PC.

Karthik et.al [15] A gentle computing technique for smart liver disease analysis was implemented. In three phases, they have implemented a class and its sort detection. In the first section, they labeled liver disorder using a set of rules of the Artificial Neural Network (ANN). In the second phase, the class guidelines with a hard set rule induction were generated using the LEM algorithm. Fuzzy rules have been implemented in the 0.33 section to perceive the liver types.

Dangare et.al [16] Analyzed prediction structures for the use of a wider variety of entering attributes for heart disease. On the Heart Disorder database, the mining class records, namely Decision Trees, Naive Bayes, and Neural Networks, are analyzed. The performance of these techniques is based entirely on accuracy in comparison. Author's assessment shows that Neuer is one of these three category models.

REFERENCE NO:	AUTHOR	METHOD USED	DATA-SET	ALGORITHM USED	EFFICIENCY	BEST ALGORITHM
1	Joel Jacob	Machine Learning	UCI Repository	SVM ,KNN & ANN	SVM-72.05% KNN-75.04% ANN-92%	ANN
2	Vijayarani	Data Mining	Liver Function Dataset	Naïve Bayes classification & Support Vector Machine	SVM-79.66 % Naïve bayes-61.28%	SVM
3	B.Saritha	Decision-Tree	Liver Function Dataset	Separation	Seperation-85.1%	Separation
4	Khashma Adnan	Neural networks	BUPA liver disorder dataset	Backpropagation& Radial Basis Function	Backpropogation-63% &Radial Basis Function-70%	Radial Basis Function
5	SajjadWaheed	Machine Learning	UCLA and AP	Bagging, K*,Naïve Bayes, logistic & REP tree	Bagging-88%,K*-100%,Naïve bayes-39%,logistic -75%& REP tree-79%	K*
6	FerdousAra	Decision Tree	UCI Repository	J48, LMT, Random Forest, Random tree, REPTree, Decision Stump, and HoeffdingTree	Random tree-66.54%, REPTree-66.3%,Decision Stump-70%	Decision Stump

Table 1: Summarized related works.

V. CONCLUSION

In this paper, we presented a detailed information about common liver diseases and various methods adapted to diagnose. From the study, it is observed that most of the research works apply data mining and machine learning algorithm for liver disease diagnosis. The summarization table in section 4 gives a clear picture of the early methods of liver disease diagnosis. Further, the study reveals that the deep learning methods are applied on medical image data set, but not on the text medical data. Hence, the future research direction for liver disease prediction could be implementing a deep learning framework that works on Indian Liver Patient Dataset (text data) collected from Kaggle.

REFERENCES

[1]. Joel Jacob, Johns Mathew, "Diagnosis of Liver Disease Using Machine Learning Techniques", IRJET,Volume-5,Issue 4 April 2018,Pgno:4011-40114.

[2]. Dr. S.Vijayarani,Mr.S.Dhayanand,"Liver Disease Predictionusing SVM & Naive Bayes Algorithms",IJSETR,Volume4,Issue 4 April 2015,Pg no:816-819.

[3]. Classification of liver data using a new algorithm, ICNFESMH-2017, "https://www.researchgate.net/publication/319353554".

[4]. Khashman Adnan," Liver Disease Diagnosis Based on Neural Networks" J. Sci. Technol. Environ. Inform. 05(01): 361-370 |Ghosh and Waheed (2017) EISSN: 2409-7632, Journal home: www.journalbinet.com

[5]. FerdousAra," Liver Disease Prediction by Using Different Decision Tree Techniques", International Journal of Data Mining & Knowledge Management Process (IJDKP) Vol.8, No.2, March 2018

[6]. Mohammad Khaleel Sallam Ma'aitah, "Intelligent Classification of Liver Disorder using Fuzzy Neural System", (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 8, No. 12, 2017.

[7]. Yugal Kumar," Prediction of different types of liver diseases using rule-based classification model", https://www.ncbi.nlm.nih.gov/m/pubmed/23963359/.

[8]. Prof. M.Surendra Prasad Babu, "A Critical Study of Selected Classification Algorithms for Liver Disease Diagnosis", International Journal of Database Management Systems (IJDMS), Vol.3, No.2, May 2011.

[9]. G.Seenuvasan, "A Comparative Study of Diagnosing Liver Disorder Disease Using Classification Algorithm", IJCSMC, Vol. 6, Issue. 8, August 2017, pg.49 – 54.

[10]. Zi-Yong Xu," Prediction of Radiation-Induced Liver Disease Using Artificial Neural Networks",https://academic.oup.com/jjco/articleabstract/36/12/783/874697.

[11]. Dhamodharan. S, Liver Disease Prediction Using Bayesian Classification, Special Issue, 4th National Conference on Advanced Computing, Applications & Technologies, May 2014, page no 1-3.

[12]. Rosalina. A.H, Noraziah. A. Prediction of Hepatitis Prognosis Using Support Vector Machine and Wrapper Method, IEEE, (2010), 2209-22

[13]. Omar S.Soliman, Eman Abo Elhamd, Classification of Hepatitis C Virus using Modified Particle Swarm Optimization and Least Squares Support Vector Machine, International Journal of Scientific & Engineering Research, Volume 5, Issue 3, March-2014 122.

[14]. Karthik. S, Priyadarishini. A, Anuradha. J and Tripathi. B. K, Classification and Rule Extraction using Rough Set for Diagnosis of Liver Disease and its Types, Advances in Applied Science Research, 2011, 2 (3): page no 334-345.

[15]. Chaitrali S. Dangare, Sulabha S. Apte, "Improved Study of Heart Disease Prediction System using Data Mining Classification Techniques", International Journal of Computer Applications (0975 – 888), Volume 47– No.10, June 2012, page no 44-48.

[16]. Mehdi Neshat, Mehdi Sargolzaei, Adel NadjaranToosi and AzraMasoumi "Hepatitis Disease Diagnosis Using Hybrid Case Based Reasoning and Particle Swarm Optimization", International Scholarly Research Network ISRN Artificial Intelligence Volume 2012, Article ID 609718, 6 pagesdoi:10.5402/2012/609718

[17]. AnjuGulia, Dr. Rajan Vohra, Praveen Rani, "Liver Patient Classification Using Intelligent Techniques",(IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 5 (4), 2014, 5110-5115,

[18]. Yogesh Singh,Pradeep Kumar Bhatia,Omprakash Sangwan, "A Review of Studies on Machine Learning Techniques", Pages -70 - 84 | Revised - 15-06-2007|Published-30-06-2007, published in IJCSS, Volume – 1 Issue-1| Publication Date - June 2007.

[19]. Machine Learning Repository, Center for Machine Learning and Intelligent Systems. https://archive.ics.uci.edu/ml/index.php