PREDICTION OF LIVER DISEASE USING CONVOLUTIONAL NEURAL NETWORK- A SURVEY

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Abstract - *Health is Wealth. Though the medical field has grown rapidly with highly effective technologies, chronic diseases such Heart and Liver diseases are life-menacing. Various life factors such as alcohol, smoking, stress, food, lifestyle, etc causes imbalance and add toxics to the human body leading to the occurrence of assorted diseases and disorders. The medical records of the patients as a vast source of data are applied to the data mining techniques to extract the valid dataset to predict the liver disease. The classification algorithms have been widely used in the decision- making process. RNN being a text classifier of deep learning technique with the advantage of processing in multiple loops in a sequential manner to obtain best performances measured by the factor of accuracy has been proposed in this study.*

*Key Words***:** *(***Liver Disease, Data Mining, Deep Learning, Classification Algorithms, Convolutional Neural Network (CNN).**)*

1. INTRODUCTION

The Liver of the human body is quite a mesmerizing internal organ which is capable of performing around 500 different functions. The major functions are boosting immunity, detoxification and cleaning, production of proteins and hormones; maintain the blood sugar level and preventing blood loss during injuries by clotting [1]. With more complex metabolic activities, the liver is known as the visceral organ hence it has the ability to re-grow and repair its own tissues. If such an organ malfunctions, it might cause serious health issues.

According to a survey on the leading causes of medical casualties in India, Liver disease comes within the top ten on the list of diseases and around the world in 2017, India has been placed on the 63rd rank for the Liver Disease. Liver diagnosis takes place through both image testing and the liver function testing. Major liver diseases include:

- **Fatty liver**- Irritation of the liver tissues
- **Cirrhosis**- Long-term Damage of the liver tissues
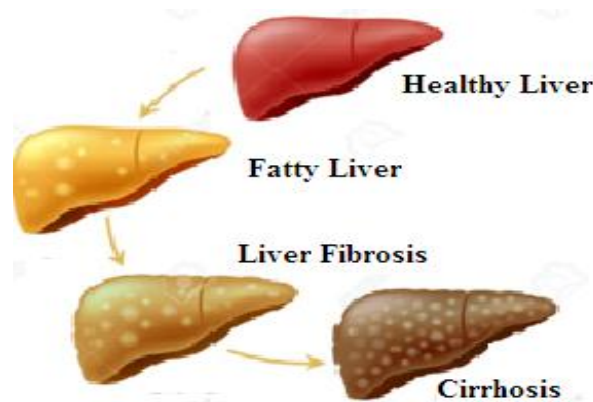- **Hepatitis A, B**- Infection of the liver tissues.

Fig 1. Stages of Liver Damage

Medical database has an enormous amount data which are subjected to data mining process to extract the required and fascinated dataset. These data sets are used to predict the disease and other odd factors using algorithms such as classification and clustering.

Both the classification and the clustering algorithms involves in the process of prediction. The clustering algorithms aids in the grouping of the data based on their common properties but the classification algorithms categories the data according to a specific predefined class [2]. Thus, the chronic diseases such as Heart, Liver, and Lung Diseases are subjected to the classification and prediction machine learning algorithms.

The Deep Learning is also a machine learning technique yet works such better than the later. The conventional machine learning algorithms are much slower in comparison with the emerging deep learning algorithms [3]. These are also known as the representation-methods since the input data has been transformed through the multi-layer representation.

According the study in "Prediction of Heart Disease using RNN Algorithms" proposed by N. Sowri Raja Pillai et al. [4], the conventional text-classification deep learning algorithm, RNN has shown prominent results in comparison with the genetic and KNN learning algorithm. Thus, this study is about the implementation of deep learning algorithm instead of using traditional machine learning algorithms.

The below table 1, illustrates the various machine learning algorithms that have been used so far to predict different kinds of disorders in the medical field. The researchers have been comparing the machine learning algorithms based on the performance measure such as accuracy.

II. RELATER WORK

S.No	Authors	Classification Techniques	Best performed Algorithm Based on Accuracy
1	Sanjay Kumar *et al.* [5]	NB, K-Means, C5.0, KNN	C5.0 with Adapative booting Algorithm
2	Ashwani Kumar *et al.* [6]	C4.5, RF, CART, REP	RF
3	Sindhuja *et al.* [7]	C4.5, NB, SVM, BPNN. CART, DT	C4.5
4	Chich- Chen *et al.* [8]	RF, NB, ANN, Logistic Regression	RF
5	Vijarani *et al.* [9]	NB, SVM	SVM
6	Alice Auxilia *et al.* [10]	DT, SVM, NB	DT
7	P. Rajeswari *et al.* [11]	NB, FT Tree, K Star Algorithm	FT Tree
8	B. V. Ramana *et al.* [12]	NB, C4.5, BPNN, SVM, KNN	KNN, BPNN
9	Veena G. S *et al.* [13]	KNN, C5.0, K-Means, NB, RF, C5.0 Boosting	C5.0 Boosting
10	Dhamodharan *et al.* [14]	NB, FT Tree	NB
11	Jeol Jacob *et al.* [15]	Logistic Regression, SVM, KNN, ANN	ANN
12	Bendi Venkata Ramana *et al.* [16]	NB, C4.5, BPNN, SVM, KNN	KNN, BPNN, SVM
13	Anju Gulia *et al.* [17]	J-48, Multilayer Preceptor, SVM, RF, NB	RF with Feature Selection
14	R. Kalaiselvi *et al.* [18]	RF, REP Tree, Decision Stump, Hoeffding	Decision Stump
15	Dr. K. Rajeswari *et al.*[19]	NB, AdaBoost, J48, Bagging, RF	RF

III. METHODOLOGY

3.1. Data Mining:

There are two forms of extraction of models in Data analysis that is based on either the categorical classes or the continuous valued function, known as classification and prediction respectively. The process of classification is composed of two consequent steps namely construction of a classifier model and implementation of a classifier for the classification. Data mining classification composed of various initial processes to retrieve the data that are used for the prediction:

- Noise data – The missing values and other irrelevant noisy data are removed during the process of data cleaning.
- Normalization – The retrieved data has been exposed to the normalization process and a scale of range (0 to1), with specified values are set to transform the data suitable for the proceeding processes.

- Pattern Recognizing - The process of prediction takes places based on the identification of certain pattern formations thus the data mining process are consider predominant.

3.2. Deep Learning:

Artificial Intelligence (AI) has the fundamental techniques that have been used in numerous applicable areas and have achieved greater results, yet have been upgraded with significant Machine Learning techniques. The intensive techniques of Machine Learning techniques mainly based on multiple layer- artificial neural networks mainly used in complex applications such Speech Recognizing, Image Identification and exclusive predictions are the deep learning algorithms.
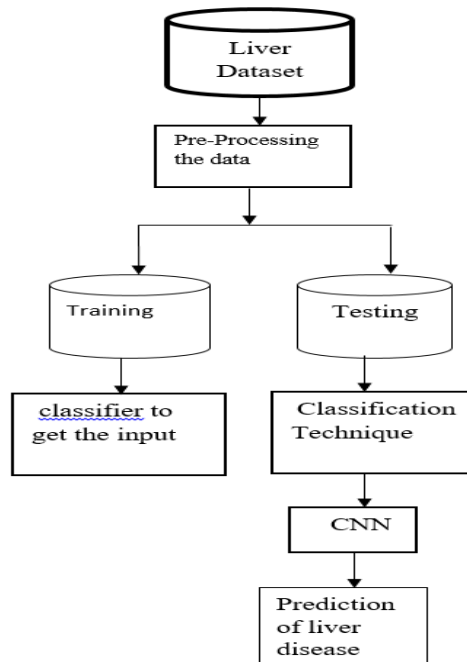

FIG 2 SYSTEM FLOW DIAGRAM

3.3. CNN

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics.

The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex. Individual neurons respond to stimuli only in a restricted region of the visual field known as the Receptive Field. A collection of such fields overlap to cover the entire visual area.

IV. CONCLUSION

Machine Learning is the subset of Artificial Intelligence which Deep Learning is the subset of Machine Learning algorithms, ensuring that Deep Learning is capable of performing better than the long-established algorithms. Thus, this paper is the proposal of RNN, a deep learning test classifier which has the scope to provide best accuracy in the prediction of Liver disease by detaining the sequential information passed down from the input dataset with optimum computational cost and time.

V. REFERENCES

[1] M.BanuPriya. P.LauraJuliet.P.R.Tamilselvi," Performane Alnalysis Of Liver Disease Prediction Using Machine Learning Algorithm" Vol 5,Issue 1,Jan 2018,Pp:206-211

[2] Himani Rani, Dr. Gaurav Gupta, "Prediction Analysis Techniques of Data Mining: A Review", IJCSMC, Vol 8, Issue 5, May 2019, Pp: 15-22.

[3] Yann LeCun, Yashua Bengio, Geoffery Hinton, "Deep Learning", Nature, Vol 521, May 2015, Pp: 436- 444.

[4] N. Sowri Raja Pillai, K. Kamurunnissa Bee, J. Kiruthika, "Predicton of Heart Disease using RNN Algorithm", IRJET, Vol 6, Issue 6, March 2019, Pp: 4452-4458.

[5] S. Kumar and S. Katyal, "Effective Analysis and Diagnosis of LiverDisorder by Data Mining," ICIRCA, Coimbatore, Pp:1047-1051, 2018.

[6] AshwaniKumar, Neelam sahu, "Categorization of liver disease using classification techniques", IJRASET, Vol 5, No 5, 2017.

[7] D.Sindhuja and R. Jemina Priyadarsini," A Survey on Classification Techniques in Data Mining for Analyzing Liver Disease Disorder", IJCSMC, Vol 5, Issue 5, May 2016.

[8] Chieh-Chen Wu , Wen-Chun Yeh , Wen-Ding Hsu , Md. Mohaimenul Islam , Phung Anh (Alex) Nguyen , Tahmin Nasrin Posly , Yao-Chin Wang, "Prediction of fatty liver disease using machine learning algorithms ", Computer Methods and Programs in Biomedicine, Vol.170, Pages 23-29, March 2019.

[9] Dr.S.Vijayarani, Mr.S.Dhayanand, "Liver disease prediction using SVM and Navies Bayes", IJSETR, Vol 4, Issue 4, April 2015.

[10] L. A. Auxilia, "Accuracy Prediction Using Machine Learning Techniques for Indian Patient Liver Disease," 2018 2nd ICOEI, Tirunelveli, 2018, Pp: 45-50.

[11] P. Rajeswari and G. SophiaReena,"Analysis of Liver Disorder Using Data Mining Algorithm", Global Journal Of Computer Science And Technology, Vol 10, Issue November 2010.

[12] B.V. Ramana, M.S.P. Babu, N.B. Venkateswarlu, A Critical Study ofSelected Classification Algorithms for Liver Disease Diagnosis, IJDMS, 2011.

[13] G. S. Veena, D. Sneha, D. Basavaraju and T. Tanvi, "Effective Analysis and Diagnosis of Liver Disorder," ICCSP, Chennai, 2018, Pp: 0086-0090.

[14] Dhamodharan. S, Liver Disease Prediction Using Bayesian Classification, Special Issue, and 4th National Conference on Advanced Computing, Applications & Technologies, May 2014, Pp: 1-3.

[15] Diagnosis of Liver Disease using Machine Learning Techniques, Joel Jacob, Joseph Chakkalakal Mathew, Johns Mathew, Elizabeth Issac, IRJET, Vol 5, Issue 4, April 2018, Pp: 4011-4014.

[16] BendiVenkataRamana, Prof. M.Surendra Prasad Babu and Prof. N. B.Venkateswarlu, "A Critical Study of Selected Classification Algorithms for Liver Disease Diagnosis", IJDMS, Vol.3, No.2 2011, Pp: 101-111.

[17] Anju Gulia, Dr. Rajan Vohra, Praveen Rani, "Liver patient classification using intelligent techniques", IJCSIT, Pp: 5110-5115.

[18] R. Kalaiselvi, G. Santhoshni, Comparative Study on Predicting the Probability of Liver Disease, IJERT, Vol 08, Issue 10, October 2019.

[19] Ayesha Pathan, Diksha Mhaske2, Shrutika Jadhav,Rupali Bhondave, Dr.K.Rajeswari,—Comparative StudyofDifferentClassification Algorithms on ILPD Dataset to Predict Liver Disorder, IJRASET, Vol. 6, Issue.2, Pp: 388-394,2018.

[20] Smriti Mukesh Singh, Dr. Dinesh B. Hanchate, "Improving Disease Prediction by Machine", IRJET, Vol 5, Issue6, June 2018, Pp: 1542-1548.

BIOGRAPHIES

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