



## A SURVEY ON PREDICTION OF LIVER DISEASE USING RNN ALGORITHM

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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.

**Index Terms** - Liver Disease, Data Mining, Deep Learning, Classification Algorithms, Recurrent Neural Network (RNN).

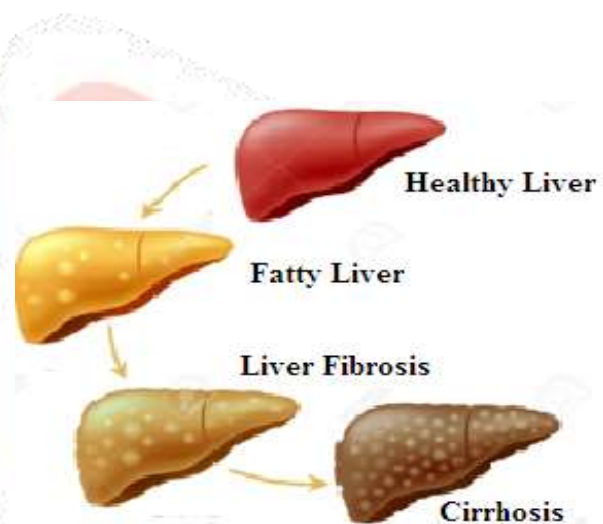


Fig 1. Stages of Liver Damage

### I. 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 63<sup>rd</sup> 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.

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 <i>et al.</i> [5]	NB, K-Means, C5.0, KNN	C5.0 with Adapative booting Algorithm
2	Ashwani Kumar <i>et al.</i> [6]	C4.5, RF, CART, REP	RF
3	Sindhuja <i>et al.</i> [7]	C4.5, NB, SVM, BPNN. CART, DT	C4.5
4	Chich- Chen <i>et al.</i> [8]	RF, NB, ANN, Logistic Regression	RF
5	Vijarani <i>et al.</i> [9]	NB, SVM	SVM
6	Alice Auxilia <i>et al.</i> [10]	DT, SVM, NB	DT
7	P. Rajeswari <i>et al.</i> [11]	NB, FT Tree, K Star Algorithm	FT Tree
8	B. V. Ramana <i>et al.</i> [12]	NB, C4.5, BPNN, SVM, KNN	KNN, BPNN
9	Veena G. S <i>et al.</i> [13]	KNN, C5.0, K-Means, NB, RF, C5.0 Boosting	C5.0 Boosting
10	Dhamodharan <i>et al.</i> [14]	NB, FT Tree	NB
11	Jeol Jacob <i>et al.</i> [15]	Logistic Regression, SVM, KNN, ANN	ANN
12	Bendi Venkata Ramana <i>et al.</i> [16]	NB, C4.5, BPNN, SVM, KNN	KNN, BPNN, SVM
13	Anju Gulia <i>et al.</i> [17]	J-48, Multilayer Preceptor, SVM, RF, NB	RF with Feature Selection
14	R. Kalaiselvi <i>et al.</i> [18]	RF, REP Tree, Decision Stump, Hoeffding	Decision Stump
15	Dr. K. Rajeswari <i>et al.</i> [19]	NB, AdaBoost, J48, Bagging, RF	RF

Table 1

## 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.

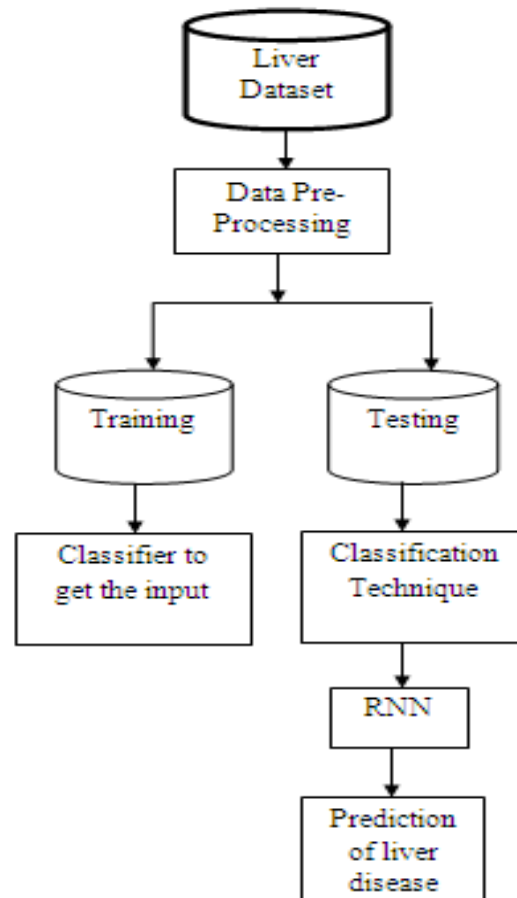


Fig 2. System Flow Diagram

### 3.3. RNN

Text classification is one the highly concentrated domain on Natural Language Processing and Supervised Machine Learning. This is an automatic process which has been used to sort the given text dataset based on the predefined class, defined during the training. The Recurrent Neural Network (RNN) is one of the Artificial Neural Network accompanied with a specific sequence based on which a directed graph has been created by connecting the subsequent nodes.

RNN has a recurrent connection on the hidden state. This looping constraint ensures that sequential information is captured in the input data. RNN algorithms are best at extracting the features from the text data, by enabling the text free from the unwanted stop words. The Parameter Sharing process in the RNN classifier aids in training of fewer parameters and also building of the classifier takes less time, by making the algorithm both cost and time optimistic [20].

## 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.

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