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Review paper on cardiac failure prediction using ML

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***Abstract*—** The Heart is a muscular organ which is next major organ after brain and having more priority in the human body. It pumps blood throughout the body through circulatory system. Nowadays prediction of heart failure is quite having a higher weightage in the medical field. Data analyst plays vital role in detection of various disease. For this kind of work more information related to patient's is required and it should be maintained on monthly basis .Some of the techniques like data mining and machine learning are used to predict the heart disease, such as Artificial Neural Network (ANN), Decision tree, Fuzzy Logic, K-Nearest Neighbour(KNN), Naïve Bayes and Support Vector Machine (SVM). Here in this paper we will review number of cardiac failure prediction papers.

Keywords- *Heart disease, cardiac failure, Machine Learning.*

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I. INTRODUCTION

In this fast moving world people want to live a very luxurious life so they work like a machine in order to earn lot of money and live a comfortable life therefore in this race they forget to take care of themselves, because of this there food habits change their entire lifestyle change, in this type of lifestyle they are more tensed they have blood pressure, sugar at a very young age and they don't give enough rest for themselves and eat what they get and they even don't bother about the quality of the food if sick the go for their own medication as a result of all these small negligence it leads to a major threat that is the heart disease. The diagnosis of heart disease is a challenging task, which can offer automated prediction about the heart condition of patient so that further treatment can be made effective.

Heart disease is one of the most censorious human diseases in the world and affects human life very badly. Heart diseases have emerged as one of the leading cause of death all around the world. According to World Health Organization, heart related diseases are responsible for the taking 17.7 million lives every year, 31% of all global deaths. Heart disease is quite common now a days. Accurate and on time diagnosis of heart disease is important for heart failure prevention and treatment. The machine learning techniques are directly used on dataset to create a significant analysis of prediction. There are number of attributes such as Age1, Sex1, Cp1, Trestbps1 etc. on which Cardiac failure can be predicted using ML algorithms. The systems in these papers are focus on prediction of heart disease by processing patient's dataset and a data of patients to whom we need to predict the chance of occurrence.

There are number of Machine learning algorithms which can be used for prediction purpose. Few of them are as follows:

A. Random Forest:

Random forest is a machine learning algorithm used for classification and regression. It creates decision trees for each attribute. It corrects the overfitting to their training set. It also avoids the missing values, outliers by following the steps of data analysis, data pre-processing. It is kind of machine learning method where the weak models are combined to form a dynamic model.

B. Naive Bayes

Navies Bayes classifier is one of best classification algorithm in machine learning which uses the Bayesian algorithm. Naive Bayes classification algorithm is strongly scalable, which require variables linear in the form of predictor variables in a problem statement.

C. Decision Tree:

Decision tree is controlled method used for the prediction of unconditional as well as numerical value. It represents the data occurrences along with their class label in the form of a tree. A

ISSN: 2454 - 4248
58 – 61

set of rules can be construed from the tree which can be used to order the unknown data record to its output value. A test on an attribute is performed on the core node. The result of the test is depicted by the branch of tree and class label are present at the leaf node.

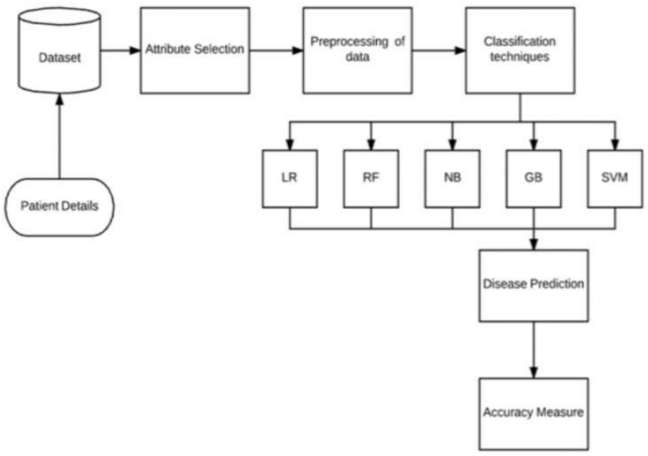

Fig. Basic block diagram of the Cardiac failure prediction system using various ML algorithms.

II. LITERATURE REVIEW

Prediction of Heart disease using machine learning algorithm Author=Mr.Santhana Krishana J.Dr.Geeta S in 2019 .In this paper they discussed about the Decision tree and Naiye Bayes algorithm. This paper focus on the information procedure for the medicinal information for prediction of the heart disease.They found Decision tree algorithm is of 91% accurate whereas Naive Bayes is 87 % accurate.[1]

Heart attack prediction system. Author=Sushmita manikanand 2017.This research study is an attempt to reduce the time and efforts of doctors as well as patients. They use GUI of web based and Naive Bayes algorithm .They found accuracy of this algorithm is 81.25% [2]

A scalable solution for heart disease prediction Author= Rashmi G Saboji Prem Kumar Naresh 2017. In this paper they propose the scalable solution for heart disease by using minimum attributes.They used Random Forest on Apache spark .Using this approach they get 98% accuracy.[3]

Heart diseases prediction and classification using machine learning algorithm optimized by particle swarm optimization and ant colony optimization Author=Youness khourdifi Mohammad Bajaj ...oct 22. ,2018 .In this paper they used fast correlation -based feature selection to filter the redundant method to improve the quality of heart disease classication .They proposed the mixed approach heart disease dataset.They used Swarm Intelligence which is a distributed solution to the complex algorithm which intend to solve complicated problems by interaction between simple agents and their environment.[4]
Automated diagnosis of heart disease using random Forest algorithm Author=Prof .Priya R.Patil Prof.S. A.Kinariwala...2018. In this proposed work , decision support system is made by three data mining techniques such as Classic Random Forest which collects the tree, Modified Random Forest which constructed tree dynamically , Weighted Random Forest is collects the attribute for the tree.[5]

Rajesh N, T Maneesha, Shaik Hafeez,Hari Krishna"Prediction of heart disease using machine learning"July 2018. In this paper they proposed the state. For prediction of heart disease using the Naive Bayes algorithm. Along with Naive Bayes algorithm they used decision trees and combination of algorithm.They exhibits an expectation framework for heart disease. [6]

Anagha sridhar,Anagha s kapardhi "Prediction of Heart disease using machine learning" Apr 2019. In this paper they discussed a work on prediction of heart disease using machine learning algorithm auch as Naive Bayes and classification tree. Classification algorithm are used to predict small set of relations between attributes in the dataset [7]

Hemalatha k n,keerthana m,meghana h r,afreen taj,bhuvana m"Heart disease prediction system" may 2019. They proposed the machine learning algorithm for prediction of heart disease .They explicit that random Forest works best with the accuracy of 98% as compared to the another algo.[10]

Senthilkumar mohan,chadrasegar thirumala,gautam shrivastava "Effective heart disease prediction using hybrid machine learning " may 2019. Machine learning algorithm were used in this proposed work.The Random Forest and Linear Method are used accurately.[8]

Fahad alotaibi"implementation of machine learning to predict heart failure" june 2019. This paper aims to improve HF prediction using UCI heart disease dataset.They propose the use of Naïve Bayes algorithm with accuracy of 86.50%.[9]

H heart disease prediction using data mining techniques Abhishek Rairikar,Vedant kulkarni ,Vikas sable 2017. In this paper they proposed the efficient genetic algorithm with the back propagation techniques approach for prediction of heart disease. They uses the more number of attributes.T heg uses the medical terms such as Gender, BP , cholesterol etc.[11]

Prediction and diagnosis of heart disease using machine learning algorithm. Sanjay kumar sen 6 june 2017. In this paper they carried out the experiment to find the predictive performance of different classifier .They uses the Naive Bayes algorithm for the better performance.[12]

Review on heart disease prediction using machine learning and data analytics approach. Marimuthu Muthuvel Sept 2018. This is review based paper which propose the different algorithm accuracy.[13]

Predication of cardiovascular disease using machine learning algorithmDinesh kumar G ,Arumugaraj k, Santosh kumar J

ISSN: 2454 - 4248
58 – 61

2018.In the proposed research , data preprocessing uses technique like removal of noisy data , removal of missing date ,filling the default values if applicable .They done the comparison between the different machine learning algorithm[14]

T. Revathi, S. Jeevitha "Comparative Study on Heart Disease Prediction System Using Data Mining Techniques" 2013. he main aim of this paper is to provide an analysis of data mining techniques on diagnosing heart disease[15]

Table: A comparative study of various algorithms in literature review

YEAR	AUTHOR	PURPOSE	TECHNIQUES USED	ACCURACY
2019	Mr. Santhana Krishana J. Dr. Geeta S	Prediction of Heart disease using machine learning algorithm	Naïve Bayes , Decision tree Dataset	Naïve Bayes : 86.56% Decision tree : 81.35%
2017	Sushmita manikanand	Heart attack prediction system.	Naïve Bayes	Naïve Bayes:81.25 %
2017	Rashmi G Saboji Prem Kumar Naresh	A scalable solution for heart disease prediction.	Random Forest on Apache spark	Random Forest: 98%
2018	Youness khourdifi Mohammad Bajaj	Heart diseases prediction and classification using machine learning algorithm optimized by particle swarm optimization and ant colony optimization	Naïve Bayes, Random Forest, Multilayer Perception	Random Forest is efficient .
2018	Prof .Priya R.Patil Prof.S. A.Kinariwala	Automated diagnosis of heart disease using random Forest algorithm	Random Forest	Random Forest is efficient.
2018	Rajesh N, T Maneesha, Shaik Hafeez,Hari Krishna	Prediction of heart disease using machine learning algorithm	Naive Bayes, decision tree,k-means	Naive byes is efficient
2019	Anagha sridhar,Anagha s kapardhi	Predicting heart disease using machine learning algorithm	Naive Bayes,decision tree classifier	decision tree was more precise in its calculation
2019	Hemalatha k n,keerthanam,meghana	Heart diease predicting system	Random forest,naive Bayes,decision tree,linear regression	random forest:95.09% , decision tree:91.32%, Naive bayes:60.38% ,linear regression:58.11%
2019	h r,afreen taj,bhuvana			
2019	Senthilkumar mohan,chadrasegar thirumala,gautam shrivastava	Effective Effecti heart disease prediction using hybrid machine learning techniques	Decision tree,random forest,naive Bayes	hybrid random forest with linear model gives 88.7% accuracy
2019	Fahad alotaibi	implementation of machine learning model to predict heart failure disease	decision tree,naive Bayes,logistic regression,SVM	SVM gives 92% efficiency
2017	Abhishek rairikar,vedant kulkarni,vikas sabale, harshwardhan kale	heart disease prediction using data mining techniques"	KNN, Decision Trees, and Naive Bayes	Naive byes is efficient
2017	Sanjay kumar sen	predicting and diagnosing of heart disease using machine learning algorithm	Naïve base classifier , Support Vector Machine , Decision Tree , K-Nearest Neighbour	Naïve base classifier=83 %, Support Vector Machine =84%, Decision Tree =77%, K-Nearest Neighbour=79%
2018	.marimuthu muthuvel	review of heart disease prediction hain machine learning and data analytics approach	Review on all present algorithms	It gives short time result which helps to give quality of services and reduce cost to individuals.
2018	.dinesh kumar G,santhosh kumar D,arumugaraj	prediction of heart disease using machine leaning algorithm	Support Vector Machine, Gradient Boosting, Random	The accuracy of random forest and logistic regression is high

 ISSN: 2454 - 4248
58 – 61

	K,marrisvari V		forest, Naive Bayes classifier and logistic regression	
2013	T. Revathi, S. Jeevitha	Comparative Study on Heart Disease Prediction System Using Data Mining Techniques	Back-propagation network , Naïve Bayes , Decision tree .	Back-propagation network =100%, Naïve Bayes= 90.74% ,Decision tree= 99.62%

III. Conclusion And Future Scope

There are many machine learning algorithms which are used to predict Heart disease. In the literature review we have seen number of papers which gives the efficient way to predict heart disease. By studding all those papers and various ways , we can conclude that all the algorithms are efficient and unique in their own way. At a different environment and a different situation particular algorithm gives maximum efficiency, for example if the systems works on small dataset naïve Bayes give high efficiency while for big dataset decision trees are efficient.

In conclusion, as identified through the literature survey, only a minor success is achieved in the creation of predictive system for heart disease patients and hence there is a need for merging and more compound models to increase the accuracy of the predicting the early onset of heart disease. The system will become very intelligent if more amount of data is given to the database. There are many possible improvements that could be done to improve the efficiency and accuracy of this prediction system. Due to less amount of time, the research/work needs to be performed for the future.

IV. References

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