A REVIEW ON HEART DISEASE PREDICTION USING MACHINE LEARNING

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ABSTRACT - Heart assumes huge role in living organisms. Diagnosis and prediction of heart related diseases requires more precision, perfection and correctness because a little mistake can cause fatigue problem or death of the person, there are numerous death cases related to heart and their checking is increasing exponentially step by step. To deal with the problem there is essential need of prediction system for awareness about diseases. Machine learning is the part of Artificial Intelligence (AI). It provides prestigious support in predicting any kind of event which takes training from common events. In this paper, we calculate accuracy of machine learning algorithms for predicting heart disease, for this algorithms are k-nearest neighbor, decision tree, linear regression and support vector machine(SVM) by utilizing UCI repository dataset for training and testing. In this paper, review the accuracy of different machine learning approaches and based on count and conclude what one is best among them.

Keywords: [Heart Disease Prediction, Machine Learning Techniques, Support Vector Machine, Artificial Intelligence.]

1. INTRODUCTION

Heart is a significant organ of the human body. It pumps blood to every piece of our life structures. On the off chance that it neglects to work correctly, then the mind and different other organs will quit working, and inside few minutes, the person will die. Change in lifestyle, work related stress and awful food propensities contribute to the increase in rate of several heart related diseases. Heart diseases have emerged as one of the most prominent cause of death all around the globe. As indicated by World Health Organization, heart related diseases are responsible for the taking 17.7 million lives every year, 31% of every worldwide death. In India as well, heart related diseases have become the leading cause of mortality.

Heart diseases have killed 1.7 million Indians in 2016, as per the 2016 Global Burden of Disease Report, released on September 15,2017. Heart related diseases increase the spending on health care and furthermore reduce the productivity of a person. Estimates made by the World Health Organization (WHO), suggest that India have lost up to $237 billion, from 2005-2015, due to heart related or Cardiovascular diseases. In this manner, feasible and accurate prediction of heart related diseases is very significant. Medical organizations, all around the globe, collect data on different health related issues. These data can be exploited utilizing different machine learning techniques to increase useful experiences. Yet, the data collected is very massive and, numerous a times, this data can

be very noisy. These datasets, which are excessively overwhelming for human personalities to comprehend, can be easily explored utilizing different machine learning techniques. Consequently, these algorithms have become very useful, in recent times, to predict the presence or absence of heart related diseases accurately. The fundamental subject is prediction utilizing machine learning technics. Machine learning is widely used now days in numerous business applications like e commerce and some more. Prediction is one of area where this machine learning used; our subject is about prediction of heart disease by processing patient's dataset and a data of patients to whom we need to predict the chance of occurrence of a heart disease.

Machine Learning
Machine learning is the scientific field dealing with the ways wherein machines gain for a reality. For some scientists, the expression "machine learning" is indistinguishable from the expression "man-made brainpower", given that the chance of learning is the principle characteristic of an element called clever in the broadest sense of the word.
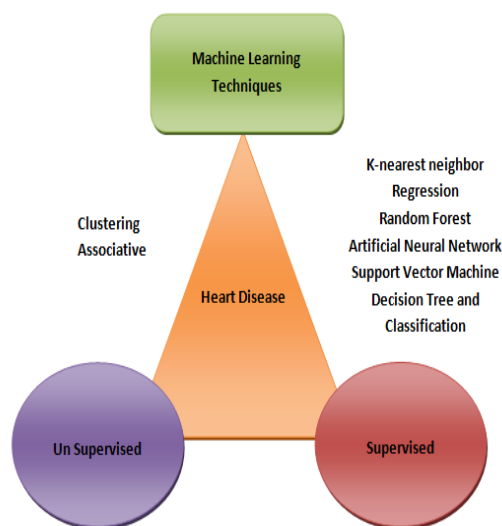

Figure1: Machine learning techniques in Heart Decease Prediction

2. LITERATURE SURVEY
1. Rahul Katarya, Polipireddy Srinivas (2020), et.al proposed Predicting Heart Disease at Early Stages using Machine Learning. Predicting heart disease at the

early stages will be valuable to the individuals around the globe with the goal that they will take important activities prior to getting serious. Heart disease is a huge issue as of late; the primary purpose behind this disease is the intake of alcohol, tobacco, and lack of actual exercise. Throughout the long term, machine learning shows successful outcomes in making decisions and predictions from the expansive arrangement of data created by the medical care industry. A portion of the supervised machine learning procedures utilized in this prediction of heart disease are artificial neural network (ANN), decision tree (DT), irregular woods (RF), support vector machine (SVM), naïve Bayes) (NB) and k-nearest neighbor algorithm. Besides, the exhibitions of these algorithms are summed up.

Merits:
This model gives better outcomes contrasted with ordinary ANN models which are available prior. Because of this utilizing this proposed model, they have 93.33% classification accuracy utilizing DNN.
Proposed a specialist framework dependent on two support vector machines (SVM) to predict heart disease efficiently.

Demerits:
It isn't to utilize scan algorithms for choosing the highlights and afterward applying machine learning strategies for prediction will give us better outcomes in the prediction of heart disease.

2. AditiGavhane, GouthamiKokkula, IshaPandya, Kailas Devadkar (2018), et.al proposed Prediction of Heart Disease Using Machine Learning. The system is spot to have the option to identify the symptoms of a heart stroke at an early stage and accordingly forestall it. It is unrealistic for an average person to regularly go through exorbitant tests like the ECG and in this way there should be a framework set up which is helpful and simultaneously solid, in predicting the odds of a heart disease. Subsequently the proposed framework is to build up an application which can predict the weakness of a heart disease given essential symptoms like age, sex, pulse rate

and so on The machine learning calculation neural networks has demonstrated to be the most accurate and dependable algorithmand consequently utilized in the proposed system.

Merits:
If the quantity of individuals utilizing the framework expands, at that point the mindfulness about their ebb and flow heart status will be known and the rate of individuals biting the dust because of heart diseases will lessen in the long run.
Also, the algorithmgives the close by solid yield dependent on the information gave by the clients.

Demerits:
The new algorithms can't be proposed to accomplish more accuracy and dependability.

3. Noor Basha, Ashok Kumar P S, Gopal Krishna C, Venkatesh P (2019) et.al proposed Early Detection of Heart Syndrome Using Machine Learning Technique. The proposed system is to predict and break down the heart related syndrome in patients, in light of one of the primary component, like age, where data researchers can do predictive examination on enormous data to early investigation on heart syndrome to spare the life of the patients. For this situation study numerous highlights are very much idea out to do AN investigation and predict of heart diseases in patients, here creator checked with prediction of data utilizing many machine learning algorithmare utilized to confirm the presentation of syndrome.

Merits:
The proposed model for heart disease patients with different algorithm, in which many key ascribes, are confirmed, out of which KNN algorithmdiscovered to be that extremely viable and efficient execution on accuracy score on heart disease prediction.
With this deduction of this redid model, machine learning algorithms will give truly important knowledge on examination and prediction of numerous chronic diseases, so in such manner scientists are useful to the needy persons, doctors and society.

Demerits:
In present market, wellbeing ventures has many machine learning apparatuses and procedures are utilized to predict different chronic diseases, yet at the same time specialists discover a type of defects, so they anticipate some more viable and efficient predictive algorithms to discover chronic diseases of humans in early stage itself.

4. RifkiWijaya ,ArySetijadiPrihatmanto , Kuspriyanto (2013), et.al proposed Preliminary Design of Estimation Heart disease by using machine learning ANN within one year. In this paper examined the improvement of heart disease prediction utilizing machine learning (for this situation the Artificial Neural Network or ANN). There are 13 factors that can decide heart disease as per Miss Chaitrali paper. Prediction of an individual's heart disease one year ahead is performed by contemplating the model heart rate data. Data is taken by utilizing device, for example, keen mirror, savvy mouse, PDAs and shrewd seat. Heart rate data were gathered through the Internet and gathered in a worker. Learning in this framework is performed for a time of one year to get enough data to make predictions. Predictive of future heart disease in one year can expand an individual's attention to heart disease itself. The framework is additionally expected to lessen the quantity of patients and the quantity of passings from heart disease.

Merits:
Neural network prediction algorithmis the best algorithmup until this point. This algorithmrequires a considerable amount of historical data so data result more accurate.

Demerits:
Data outcome on this apparatus may inconsistent. Data on this device is relying upon how huge the force of light into client faces and the camera.

5. B.KeerthiSamhitha, SarikaPriya. M. R, Sanjana. C, Suja Cherukullapurath Mana and Jithina Jose (2020), et.al proposed Improving the Accuracy in Prediction of Heart Disease using Machine

Learning Algorithms. This paper explores a strategy named outfit characterization, which is used for improving the exactness of fragile figurings by uniting various classifiers. Examinations with this mechanical assembly were performed using a heart disease dataset. The point of convergence of this paper isn't simply on extending the exactness of fragile request figurings, yet also on the execution of the computation with a helpful dataset, to demonstrate its utility to foresee disease at a starting period. The outcomes of the examination show that group strategies, for instance, stowing and boosting, are feasible in improving the desire precision of weak classifiers, and show satisfactory execution in recognizing peril of heart disease.

Merits:
An epic strategy that targets finding basic features by applying machine learning strategies achieving improving the precision in the estimate of cardiovascular illness.
The demise rate can be unquestionably controlled if the illness is recognized toward the starting time frames and assurance measures are gotten at the earliest chance.

Demerits:
Data outcome on this device may inconsistent. Data on this instrument is relying upon how huge the force of light into client faces and the camera.

6. Chu-Hsing Lin, Po-Kai Yang, Yu-ChiaoLin, Pin-Kuei Fu (2020), et.al proposed On Machine Learning Models for Heart Disease Diagnosis. Convolutional Neural Networks (CNNs) have unexpected engineering in comparison to ordinary Neural Networks (NNs) and are both applied broadly in numerous application fields. In this paper, creator utilized both of the two machine learning models in the heart disease diagnosis issues. We actualized the algorithms, tuned the parameters, and led a progression of trials. The intend to think about the prediction accuracy of the two models under various parameters settings. We utilized the Cleveland database which is took from UCI learning dataset storehouse for diagnosis heart disease. From the exploratory outcomes, we found that NNs beat CNNs in prediction accuracy in the greater part of the cases.

Merits:
Got better outcome when the quantity of neurons lesser than 20, by fixing the quantity of concealed layers and changing the quantity of neurons in each layer.

Demerits:
For that CNN fails to meet expectations NN, one potential explanation we accepted that is the size of dataset just 303 examples. For this, can't ready to research the models dependent on bigger dataset.

7. RahmaAtallah, Amjed Al-Mousa (2019), et.al proposed Heart Disease Detection Using Machine Learning Majority Voting Ensemble Method. This paper presents a lion's share voting ensemble method that can predict the possible presence of heart disease in humans. The prediction is based on simple affordable medical tests conducted in any nearby facility. Moreover, the point of this project is to provide more confidence and accuracy to the Doctor's diagnosis since the model is trained utilizing real-life data of healthy and sick patients. The model classifies the patient based on the dominant part vote of several machine learning models to provide more accurate arrangements than having just one model. At long last, this methodology produced an accuracy of 90% based on the hard voting ensemble model.

Merits:
The Ensemble model achieved 90% accuracy, which exceeds the accuracy of each individual classifier.
The model can be used to help doctors in investigating patient cases to validate their diagnosis and help decrease human error.

Demerits:
The overall accuracy of this project after directing the hard voting ensemble method came out to be 90% which is considered a genuinely adequate accuracy that can't be further assembled.

8. Senthil kumarmohan, Chandrasegar Thirumalai, and Gautam Srivastava

(2019), et.al proposed Effective Heart Disease Prediction using Hybrid Machine Learning Techniques.In this paper, we propose a novel method that targets finding huge features by applying machine learning techniques resulting in improving the accuracy in the prediction of cardiovascular disease. The prediction model is introduced with different blends of features and several known classification techniques. We produce an enhanced performance level with an accuracy level of 88.7% through the prediction model for heart disease with the crossover arbitrary forest with a linear model (HRFLM).

Merits:
This result clearly proves that all the features selected and ML techniques used, prove effective in accurately predicting heart disease of patients compared with known existing models.

Demerits:
Furthermore, new feature selection methods can't be developed to get a broader perception of the significant features to increase the performance of heart disease prediction.

9. B. KeerthiSamhitha, SarikaPriya. M. R, Sanjana. C, Suja Cherukullapurath Mana and Jithina Jose (2020), et.al proposed the system of Improving the Accuracy in Prediction of Heart Disease using Machine Learning Algorithms.This paper explores a technique named outfit characterization, which is utilized for improving the exactness of slight estimations by solidifying different classifiers. Investigations with this mechanical assembly were performed using a heart disease dataset. The point of convergence of this paper isn't simply on expanding the exactness of slight order counts, yet moreover on the execution of the estimation with a restorative dataset, to demonstrate its utility to anticipate infection at a beginning period. The consequences of the investigation show that group strategies, for example, stowing and boosting, are viable in improving the expectation precision of feeble classifiers, and show

palatable execution in recognizing danger of heart disease.

Merits:
The forecast model is presented with different mixes of features and a few known grouping procedures.

Demerits:
Heart disease with the crossbreed irregular woods with a straight model isn't proposed.

10. Amin UlHaq, Jianping Li, Muhammad Hammad Memon, Muhammad HunainMemon, Jalaluddin Khan, Syeda Munazza Marium(2019), et.al proposed Heart Disease Prediction System Using Model Of Machine Learning and Sequential Backward Selection Algorithm for Features Selection. The proposed system performances have been measured by utilizing evaluation metrics. The experimental results shows that Sequential Backward Selection (SBS) algorithms choose appropriate features and these features increase the accuracy utilizing K-Nearest Neighbor supervised machine learning classifier. The great accuracy of this examination suggests that the proposed model will effectively identify the HD and healthy subjects.

Merits:
The experimental results show that the use of SBS algorithmto choose the appropriate number of features that can be used for better classification accuracy utilizing K-Nearest Neighbor.
The better classification accuracy of the proposed technique suggests that the proposed method could be used to correctly arrange HD and healthy people.

Demerits:
All features coefficient have same values. Min-Max Scalar feature values range between 0 and 1. Feature having missing values are deleted.

11. Pranav Motarwar, Ankita Duraphe, G Suganya M Premalatha (2020), et.al proposed Cognitive Approach for Heart Disease Prediction using Machine Learning. The proposed system explores a machine

learning framework to predict the chance of having heart disease utilizing different algorithms. The framework is executed utilizing five algorithms Random Forest, Naïve Bayes, Support Vector Machine, Hoeffding Decision Tree, and Logistic Model Tree (LMT). Cleveland dataset is used for preparing and testing the model. The dataset is preprocessed followed by feature selection to select most prominent features. The resultant dataset is then used for preparing the framework. The results are combined and show that Random forest gives most extreme accuracy.

Merits:
The prime purpose of this paper is to predict possibilities of heart related disease more accurately.

Demerits:
It won't be to add more info attributes and analyze the results utilizing proposed models.

12. Jian Ping Li , Amin UlHaq , Salah Ud Din , Jalaluddin Khan , Asif Khan , And AbdusSaboor(2020) , et.al proposed the Heart Disease Identification Method Using Machine Learning Classification In E-Healthcare**.**The system is developed based on classification algorithms includes Support vector machine, Logistic regression, Artificial neural network, K-nearest neighbor, Naïve bays, and Decision tree while standard features selection algorithms have been used, for example, Relief, Minimal redundancy maximal relevance, Least absolute shrinkage selection operator and Local learning for removing irrelevant and redundant features, likewise proposed novel quick contingent common data feature selection algorithmto solve feature selection problem. Furthermore, the leave one subject out cross-approval method has been used for learning the best practices of model assessment and for hyper parameter tuning. The performance measuring metrics are used for assessment of the performances of the classifiers. The performances of the classifiers have been checked on the selected features as selected by features selection algorithms. The experimental results show that the proposed feature selection algorithm

(FCMIM) is feasible with classifier support vector machine for designing an elevated level intelligent system to identify heart disease.

Merits:
The features selection algorithms are used for features selection to increase the classification accuracy and reduce the execution time of classification system.
The suggested diagnosis system (FCMIM-SVM) achieved great accuracy as compared to previously proposed methods. Moreover, the proposed system can easily be implemented in healthcare for the identification of heart disease.

Demerits:
Will not be use other features selection algorithms, optimization methods to further increase the performance of a predictive system for HD diagnosis.

CONCLUSION
The overall point is to define different machine learning techniques useful in effective heart disease prediction. Efficient and accurate prediction with a lesser number of attributes and tests is our objective. In this paper, Machine Learning Techniques are applied, for example, classification techniques, K-nearest neighbor, Naive Bayes, decision tree, and random forest. K-nearest neighbor, Naïve Bayes, and random forest are the algorithms demonstrating the best results in this model. Considering the constraints of this investigation, there is a need to implement more complex and blend of models to get higher accuracy for early prediction of heart disease.

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