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AI driven Heart disease Assessment and Prediction

Debasmita Mallick, Saloni Mallick, Tarini Prsasad Satapathy
Department of Computer Science and Engineering, ABIT, Cuttack
Department of Computer Science and Engineering, ABIT, Cuttack
Department of Computer Science and Engineering, ABIT, Cuttack

ABSTRACT:
Currently, the huge amount of data is available everywhere.Therefore, it is very important to scan this data to extractsome useful intelligence and to enlarge an algorithm throughdata science,data mining and machine learning. Machine learning isa subset of Artificial Intelligence which has been a key component of digitization solutions that has caught major curiosity in the digital platform. Heart attack or disease is the main cause for suffering and death in the world over the last decade. The heart disease prediction can be applied Machine Learning algorithms. In this paper, we use the different machine learning techniques have beenstudied list of existing Machine learning algorithms and it compares theresult using various performance metrics. The existing and publicly available datasets of heart disease patients from UCI repository isused to test. This dataset consists of 303 instances and 14 attributes. In this study seven different machine learning techniques were used for comparison based on various performance metrics.
KEYWORDS: Artificial Intelligence,Shallow Learning, Machine learning, Deep Learning.

I. INTRODUCTION

Now day's heart disease is the one the problem in the world. Heart disease or attack more than people deaths or suffers occur during the first heart attack. But not only for heart disease or attackhave some problems attacked for various cancers, ventricle, and Valve, etc.… a common heart disease is nothing. But a cardiovascular disease or a coronary heart disease is a very harmful disease the majority of peopleattack for heart disease from the world. Coronary heart disease blood vessels around it. This disease causes disability as damage to central nervous systemso resulting in death. The other heart disease is dyspnea, chest pain, palpitations, presyncope or syncope and fatigue. The classification system of the New York Association is commonly employed. In following individual patients, it isimportant to document specified activities that produce symptoms shown in Table-I.

TABLE-I: TheFunctional Classification of Heart Disease

Class I	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, dyspnea, or angina pain.
Class II	Silent limitation of physical activity. Ordinary physical activity results in symptoms
Class III	Marked limitation of physical activity comfortable at rest, but less than Ordinary physical activity symptoms
Class IV	Unable to engage in any physical activity without discomfort. Symptoms may be present even at rest.

We need a cardiologist for heart disease diagnosis, which are limited in developing countries. In heart disease, the cardiovascular diseases are quite expensive; sometimes out of the budget for common people. Early detection is prime in case of cardiology or heart disease with less expensive prediction techniques. As we know, Machine Learning algorithms are used for predicting several diseases. They are also used for predicting heart disease. In this paper, we deal Machine Learningalgorithms applied for predicting heart disease, the collection of attributes to predict the disease and selection of collection of attributes for predication.

This paper is structured as follows. Section II discusses literature survey, Section III proposes our original taxonomy of ML algorithms applied to heart disease, Section IV outlines Different Machine Learning Techniques, Section V generates the proposed model, Section, and Section VI concludes.

II. LITERATURE SURVEY

In the work of Sachin et al. [1], we have studied the various machine learning techniques and application areas. Also, studiedthe role of machine learning in different fields and some ofother applications.

In the work of Susmita et al. [2], we have studied the most frequentlyused machine learning algorithms to solve regression, classification,and clustering problems. It is also presented the advantages and disadvantages of machine learning algorithms have been discussed alongwith comparison of different algorithms (wherever

possible) and its performance, learning rate etc. Along with examples of practical applications of machine learningalgorithms.

In the work of Sangya et al. [3], we have studied the main object is to compare different machine learning algorithms and it performed better in some situation and worse in another.This is also presented Supervised Learning Algorithm for the analysis the risk of heart disease of a patient. It can be detected heart related diseases by using the model trainedfrom a publicly available dataset. Also, it is shown that a marginal success is realizedin the creation of predicted model for heart disease and there is a combinational and morecomplex models to rise the accuracy of predicting the early outbreak of heart disease.

In the work of Jaymin et al. [4], we have studied only a marginal success is achieved in thecreation of predictive model for heart disease patients. Also, it analyzed,the J48 tree technique fit to be good classified for heart disease prediction because it is presentedmore accuracy and least total time to build. Also stated the best algorithm J48 based on UCI datasets has the highest accuracy and the total time to build model.

In the work of Liaqat Ali et al. [5], we have studied an expert system which is based on stacked Support Vector Machineswas proposed for the diagnosis of Heart failure disease.The first Support Vector Machine model was used to remove unrelated features while the second model was used as predictive model. Hence combined the two models which were optimized using a hybrid grid search algorithm.

In the work of S. Mohan et al. [6], we have studied Machine learning techniques were used to process raw data and provide a new and novel refinementtowards heart disease. Also it is presented Heart disease prediction is challengingand very important in the medical field. Theproposed hybrid random forest with a linearmodel (HRFLM) approach is used combining theproperties of Linear Method (LM) and Random Forest (RF).Hence, the HRFLM is proved the accurate prediction for heart disease.

III. CLASSIFICATION OF MACHINE LEARNING ALGORITHMS FOR HEART DISEASE

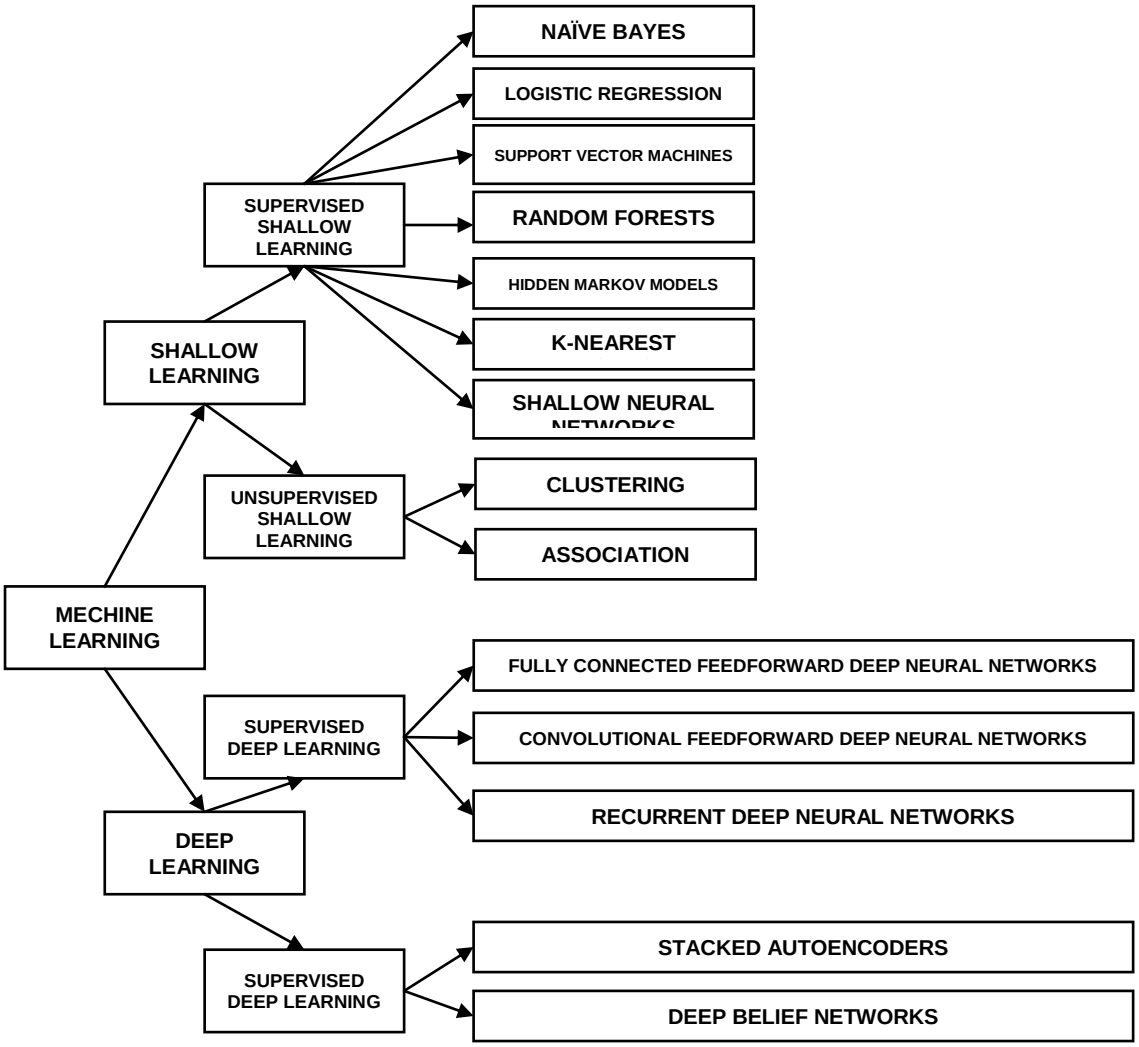

FIGURE 01:

The Classification of Machine Learning Algorithms for Heart Disease Applications.

Machine learning (ML) includes a large number of paradigms in continuous evolution, introducing weak boundaries and cross correlations. In addition, the different views andapplications may conduct to separate classifications.In the traditional Machine Learning algorithms, which today can be referredto as Shallow Learning (SL), which in opposition to thecurrent Deep Learning (DL). The SL requires a domain expert (that is, a feature application engineer) whocan execute the analyticaltask of identifying the relate data characteristics beforeexecuting the SL algorithm. The DL relies on a multi-layered representationof the input data and can execute feature selection self-determining through a processdefined representation learning.Also, SL and DL approaches can be further specified by distinguishing betweensupervised algorithms and unsupervised algorithms. The former techniques require a trainingprocess with a large and representative dataset that have been classifiedby a human expert. But the latter approaches do not require a pre categorizedtraining dataset. In this section, we consider the most popularcategories of ML algorithms and compare it, which show as the leaves of the classification tree structure inFigure 1.

IV. MACHINE LEARNING TECHNIQUES

A. SUPPORT VECTOR MACHINE(SVM):

In the 1960, a SVM was first introduced. SVM is a supervised learning machine learning classification algorithm that has become extremely in demand nowadays owing to its extremely efficient results. It is implemented in different way than other machine learning algorithms. But it is capable of performing classification, regression and outlier observation.

B. RANDOM FOREST

Random forest is a supervised learning algorithm.In this algorithm, the "forest" it builds, is cast of decision tree.

C. K-NEAREST NEIGHBORS (KNN)

KNN algorithm is a supervised machine learning algorithm which can be used to solve both regression problems and classification.

D. DECISION TREE

This is a tree like graph or model of decisions and their possible consequences. In this algorithm, each internal node represents a “test”, each branch represents the "outcome" of the test, and leaf node represents a "class".

E. Naïve Bayes

This algorithm is a supervised learning algorithm, which is based on Bayes theorem and used for solving classification that includes a high-dimensional training dataset.It helps in building the fast machine learning models that can make quick predictions.

F. LOGISTIC REGRESSION

This is a predictive analysis technique which used for binary classification problems andpredict the outcome in a binary variable whichhas only two possible outcomes. Also it analyzes a dataset which has adependent variable and more than one more independent variables.Thus, the independent variables are called the predictors and the Dependent variable is also referred as target variable.

V. PROPOSED EORK

Algorithm

Step No:

1. Select the problem statement (i.e.study the dataset and to predict whether a person has heart disease or does not have heart disease. If a person has a heart disease it is represented 1. Otherwise, it is represented by 0.
2. Collect the heart disease data from Cleveland database of UCI repository
3. Preprocess and clean the data
4. Set train and build ML models for heart disease
5. Set attributes for inputs as given in dataset
6. Set target and predictor variables
7. Select sample data from 1 to 309.
8. Apply the train model on user input which will test data using some features as used in training.
9. Estimate heart disease target value with ML Models.
10. Repeat steps 7 to 9, with training data being selected randomly
11. Comparisons of various learning method based on classification result.

12. Prediction of heart disease

Flowchart design as per above algorithm shown in figure 02.

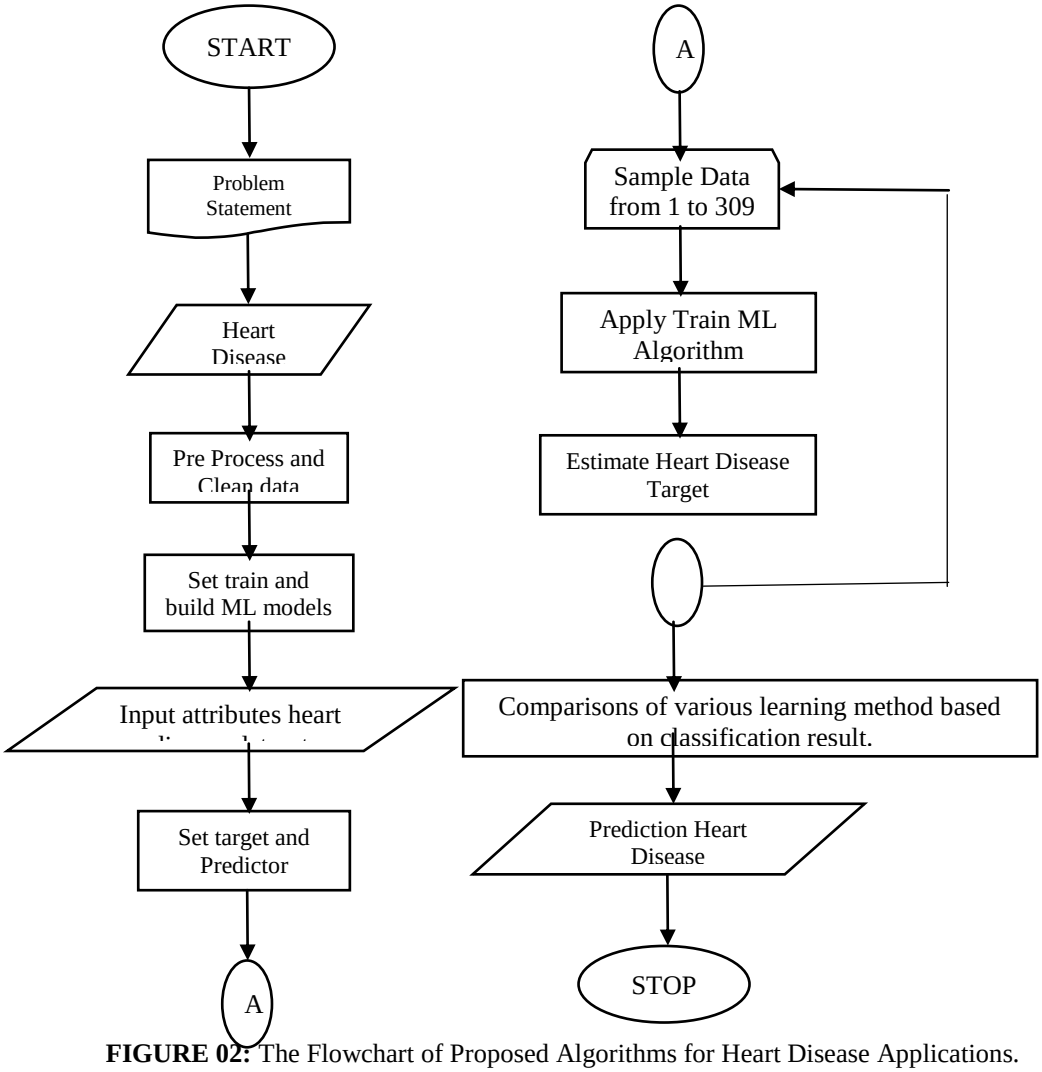

FIGURE 02: The Flowchart of Proposed Algorithms for Heart Disease Applications.

VI. CONCLUSIONS

ML approaches are increasingly working for multipleapplications and are being appropriate for heart disease; hence it is important toestimate when and which group of algorithms can achieve adequate results.

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