

Hybrid Heart Disease Prediction Technique of Opinion Mining Algorithms

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Abstract- Heart plays significant role in living organisms. Diagnosis and prediction of heart related diseases requires more precision, perfection and correctness because a touch mistake can cause fatigue problem or death of the person, there are numerous death cases associated with heart and their counting is increasing exponentially day by day. To affect the matter there's essential need of prediction system for awareness about diseases Machine learning is that the branch of Artificial Intelligence (AI), it provides prestigious support in predicting any quite event which take training from natural events. During this paper, we calculate accuracy of machine learning algorithms for predicting heart disease, for this algorithms are k-nearest neighbor, decision tree, rectilinear regression and support vector machine(SVM) by using UCI repository dataset for training and testing. For implementation of Python programming Anaconda (jupyter)notebook is best tool, which have many sort of library, header file, that make the work more accurate and precise.

Keywords- Heart Disease, Data Mining, Classification, Supervised, Unsupervised, Linear regression, decision tree.

I. INTRODUCTION

Heart is one among the foremost extensive and vitals of human body therefore the care of heart is important. Most of diseases are associated with heart therefore the prediction about heart diseases is necessary and for this purpose comparative study needed in this field, today most of patient are died because their diseases are recognized eventually stage thanks to lack of accuracy of instrument so there's got to realize the more efficient algorithms for diseases prediction. Machine Learning is one among the efficient technology for the testing, which is predicated on training and testing. it's the branch of Artificial Intelligence(AI) which is one among broad area of earning where machines emulating human abilities, machine learning may be a specific branch of AI. On the opposite hand machines learning systems are trained to find out the way to process and make use of knowledge hence the mixture of both technology is additionally called as Machine Intelligence. As the definition of machine learning, it learns from the natural phenomenon, natural things so during

this project we uses the biological parameter as testing data like cholesterol, Blood pressure, sex, age, etc. and on the idea of those, comparison is completed within the terms of accuracy of algorithms such as during this project we've used four algorithms which are decision tree, rectilinear regression, k-neighbor, SVM. In this paper, we calculate the accuracy of 4 different machine learning approaches and on the idea of calculation we conclude that which one is best among them.

Section 1 of this paper consist the introduction about the machine learning and heart diseases. Section II described, the machine learning classification. Section III illustrated the related work of researchers. Section IV is about the methodology used for this prediction system. Section V is about the algorithms utilized in this project. Section VI briefly describes the dataset and their analysis with the results of this project. And therefore the last Section VII concludes the summary of this paper with slight view about future scope of this paper.

II. RELATED WORK

Heart is one among the core organ of physical body , it play crucial role on blood pumping in physical body which is as essential as the oxygen for physical body so there's always need of protection of it, this is often one among the large reasons for the researchers to figure on this. So there are number of researchers working on it .There is always need of study of heart related things either diagnosis or prediction otherwise you can say that protection of heart condition .There are various fields like artificial intelligence, machine learning, data processing that contributed on this work .

Performance of any algorithms depends on variance and biasness of dataset [4]. As per research on the machine learning for prediction of heart diseases himanshu et al.[4] naive bayes perform well with low variance and high biasness as compare to high variance and low biasness which is knn. With low biasness and high variance knn suffers from the problem of over fitting this is often the rationale why performance of knn get decreased. There are various advantage of using low variance and high biasness because the dataset small it take less time for training also as testing

algorithm but there also some disadvantages of using small size of dataset. When the dataset size get increasing the asymptotic errors are get introduced and low biasness, low variance based algorithms play well during this sort of cases. Decision tree is one among the nonparametric machine learning algorithm but as we all know it suffers from the matter over fitting but it cloud be solve by some over fitting removable techniques. Support vector machine is algebraic and statics background algorithm, it construct a linear separable n-dimensional hyper plan for the classification of datasets.

The nature of heart is complex, there's need of carefully handling of it otherwise it cause death of the person. The severity of heart diseases is assessed supported various methods like knn, decision tree, generic algorithm and naïve bayes [3]. Mohan et al.[3] define how you'll combine two different approaches to form one approach called hybrid approach which have the accuracy 88.4% which is quite of all other.

Some of the researchers have worked on data processing for the prediction of heart diseases. Kaur et al.[6] have worked on this and define how the interesting pattern and knowledge are derived from the massive dataset. They perform accuracy comparison on various machine learning and data processing approaches for locating which one is best among then and obtain the result on the favor of svm.

Kumar et al.[5] have worked on various machine learning and data processing algorithms and analysis of those algorithms are trained by UCI machine learning dataset which have 303 samples with 14 input feature and located svm is best among them, here other different algorithms are naivybayes, knn and decision tree.

Gavhane et al.[1] have worked on the multilayer perceptron model for the prediction of heart diseases in person and the accuracy of the algorithm using CAD technology. If the number of person using the prediction system for his or her diseases prediction then the notice about the diseases is also getting to increases and it make reduction within the death rate of heart patient.

Some researchers have work on one or two algorithm for predication diseases. Krishnan et al. [2] proved that call tree is more accurate as compare to the naïve bayes classification algorithm in their project. Machine learning algorithms are used for various sort of diseases predication and lots of the researchers have work on this like Kohali et al.[7] work on heart diseases prediction using logistic regression, diabetes prediction using support vector machine,

carcinoma prediction using Adaboost classifier and concluded that the logistic regression give the accuracy of 87.1%, support vector machine give the accuracy of 85.71%, Adaboost classifier give the accuracy up to 98.57% which good for predication point of view.

A survey paper on heart diseases predication have proven that the old machine learning algorithms doesn't perform good accuracy for the predication while hybridization perform good and provides better accuracy for the predication[8].

III. METHODOLOGY OF SYSTEM

Processing of system start with the info collection for this we uses the UCI repository dataset which is well verified by number of researchers and authority of the UCI [15].

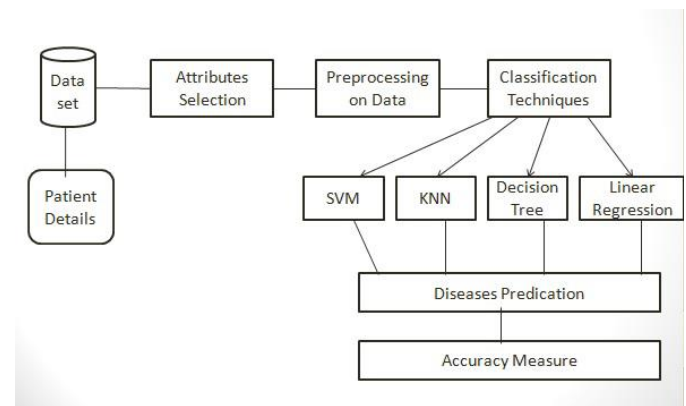


Fig.1 Architecture of Prediction System

A. Data Collection

First step for predication system is data collection and deciding about the training and testing dataset. during this project we have used 73% training dataset and 37% dataset used as testing dataset the system.

B. Attribute Selection

Attribute of dataset are property of dataset which are used for system and for heart many attributes are like heart bit rate of person, gender of the person, age of the person and lots of more shown in TABLE.1 for predication system.

TABLE.1 Attributes of the Dataset

S. No.	Attribute	Description	Type
1	Age	Patient's age (29 to 77)	Numeric
2	Sex	Gender of patient(male-0 female-1)	Nominal
3	Cp	Chest pain type	Nominal
4	Trestbps	Resting blood pressure(in mm Hg on admission to hospital ,values from 94 to200)	Numerical
5	Chol	Serum cholesterol in mg/dl, values from 126 to 564)	Numerical
6	Fbs	Fasting blood sugar>120 mg/dl, true-1 false-0)	Nominal
7	Resting	Resting electrocardiographics result (0 to 1)	Nominal
8	Thali	Maximum heart rate achieved(71 to202)	Numerical
9	Exang	Exercise included agina(1=yes0-no)	Nominal
10	Oldpeak	ST depression introduced by exercise relative torest (0 to.2)	Numerical
11	Slope	The slop of the peak exercise ST segment (0 to 1)	Nominal
12	Ca	Number of major vessels (0-3)	Numerical
13	Thal	3-normal	Nominal
14	Targets	1 or 0	Nominal



Fig.2 Target class view

C. Pre-processing of knowledge

Pre-processing needed for achieving prestigious result from the machine learning algorithms. For instance Random forest algorithm doesn't support null values dataset and for this we have to manage null values from original data. For our project we've to convert some categorized value by dummy value means within the sort of “0”and “1” by using following code:

D. Data Balancing

Data balancing is important for accurate result because by data balancing graph we will see that both the target classes are equal. Fig.3 represents the target classes where “0” represents with heart diseases patient and “1” represents no heart diseases patients.

E. Accuracy calculation

Accuracy of the algorithms are depends on four values namely true positive(TP), false positive(FP), true negative(TN) and false negative(FN).

$$\text{Accuracy} = \frac{FN+TP}{(TP+FP+TN+FN)} \quad (2)$$

The numerical value of TP, FP, TN, FN defines as: TP= Number of person with heart diseases
 TN= Number of person with heart diseases and no heart diseases
 FP= Number of person with no heart diseases
 FN= Number of person with no heart diseases and with heart diseases

IV. RESULT

After performing the machine learning approach for testing and training we find that accuracy of the knn is much efficient as compare to other algorithms. Accuracy should be calculated with the support of confusion matrix of each algorithms as shown in Fig.6 and Fig.7 here number of count of TP, TN, FP, FN are given and using the equation (2) of accuracy, value has been calculated and it is conclude that knn is best among them with 87% accuracy and the comparison is shown in TABLE.2

TABLE.2 Accuracy comparison

Algorithm	Accuracy
Support Vector machine	83%
Decision tree	79%
Linear regression	78%
k-nearest neighbor	87%

V. CONCLUSION

Heart is one among the essential and vitals of physical body and prediction about heart diseases is additionally important concern for the citizenry in order that the accuracy for algorithm is one among parameter for analysis of performance of algorithms. Accuracy of the algorithms in machine learning depends upon the dataset that used for training and testing purpose. When we perform the analysis of algorithms on the idea of dataset whose attributes are shown in TABLE.1 and on the idea of confusion matrix, we discover KNN is best one.

For the longer term Scope more machine learning approach are going to be used for best analysis of the guts diseases and for earlier prediction of diseases in order that the speed of the death cases are often minimized by the notice about the diseases.

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