iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** VI **Month of publication:** June 2022

DOI: https://doi.org/10.22214/ijraset.2022.43949

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VI June 2022- Available at www.ijraset.com

Predicting Diseases Using Machine Learning Algorithms

Varun Dahiya[1], Prince[2], Gurpreet Kaur[3]
[1,2] *Student, Department of Computer Science and Engineering, MVSIT, Sonipat*
[3]*Project Guide, Assistant Professor, Department of Computer Science and Engineering, MVSIT, Sonipat*

Abstract: Prediction and diagnosing of heart disease become a challenging factor faced by doctors and hospitals both in India and abroad. In order to reduce the large scale of deaths from heart diseases, a quick and efficient detection technique is to be discovered. Data mining techniques and machine learning algorithms play a very important role in this area. The researchers accelerating their research works to develop a software with the help machine learning algorithm which can help doctors to take decision regarding both prediction and diagnosing of heart disease. The main objective of this research paper is predicting the heart disease of a patient using machine learning algorithms. Comparative study of the various performance of machine learning algorithms is done through graphical representation of the results
Keywords - detection technique, machine learning technique, machine learning algorithm.

I. INTRODUCTION

The highest mortality of both India and abroad is due to heart disease. So it is vital time to check this death toll by correctly identifying the disease in initial stage. The matter become a headache for all doctors both in India and abroad. Now a days doctors are adopting many scientific technologies and methodology for both identification and diagnosing not only common disease, but also many fatal diseases. The successful treatment is always attributed by right and accurate diagnosis. Doctors may sometimes fail to take accurate decisions while diagnosing the heart disease of a patient, therefore heart disease prediction systems which use machine learning algorithms assist in such cases to get accurate results.

HEART DISEASE: The heart attack occurs when the arteries which supply oxygenated blood to heart does not function due to completely blocked or narrowed.

Various types of heart diseases are-

1) Coronary heart disease
2) Cardiomyopathy
3) Cardiovascular disease
4) Ischaemic heart disease
5) Heart failure
6) Hypertensive heart disease
7) Inflammatory heart disease
8) Valvular heart disease

Common risk factors of heart disease include

1) High blood pressure
2) Abnormal blood lipids
3) Use of tobacco
4) Obesity
5) Cholestrol level
6) Diabetes
7) Age
8) Gender
9) Chest Pain

Machine Learning is extensively used in diagnosing several diseases like heart and other crucial diseases. Among

©IJRASET: All Rights are Reserved

various algorithms in data modeling, decision tree is known as the most popular due to its simplicity and interpretability. Now a days more efficient algorithms such as SVM and artificial neural networks have also become popular

The rest of the paper is organized as follows: Section II provides data description; Section III Algorithm used; Section IV provided performance comparision. Section V concludes the paper.

II. DATASET DESCRIPTION

We performed computer simulation on one dataset. Dataset is a Heart dataset. The dataset is available in UCI Machine Learning Repository. Dataset contains 303 samples and 14 input features as well as 1 output feature. The features describe financial, personal, and social feature of loan applicants. The output feature is the decision class which has value 1 for good credit and 2 for Bad credit. The dataset-1 contains 700 instances shown as good credit while 300 instances as bad credit. The dataset contains features expressed on nominal, ordinal, or interval scales. A list of all those features is given in Table 3.2.

Table: Features in the Dataset

Feature No.	**Feature Name**
1	age
2	sex
3	cp
4	trestbps
5	choi
6	fbs
7	restesg
8	thalach
9	exang
10	oldpeak
11	slop
12	ca
13	thal
14	num

III. ALGORITHM USED

A. Naïve Base Classifier

This classifier is a powerful probabilistic representation, and its use for classification has received considerable attention. This classifier learns from training data the conditional probability of each attribute Ai given the class label C. Classification is then done by applying Bayes rule to compute the probability of C given the particular instances of A1…..An and then predicting the class with the highest posterior probability. The goal of classification is to correctly predict the value of a designated discrete class variable given a vector of predictors or attributes. In particular, the Naive Bayes classifier is a Bayesian network where the class has no parents and each attribute has the class as its sole parent. Although the naive Bayesian (NB) algorithm is simple, it is very effective in many real world datasets because it can give better predictive accuracy than well known well known methods like C4.5 and BP [11],[12] and is extremely efficient in that it learns in a linear fashion using ensemble mechanisms, such as bagging and boosting, to combine classifier predictions [13]. However, when attributes are redundant and not normally distributed, the predictive accuracy is reduced [14].

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

B. Logistic Regression

Logistic Regression was used in the biological sciences in early twentieth century. It was then used in many social science applications. Logistic Regression is used when the dependent variable(target) is categorical.

For example,

- To predict whether an email is spam (1) or (0)
- Whether the tumor is malignant (1) or not (0)

Consider a scenario where we need to classify whether an email is spam or not. If we use linear regression for this problem, there is a need for setting up a threshold based on which classification can be done. Say if the actual class is malignant, predicted continuous value 0.4 and the threshold value is 0.5, the data point will be classified as not malignant which can lead to serious consequence in real time.

C. Support Vector Machine

Support vector machines exist in different forms, linear and non-linear. A support vector machine is a supervised classifier. What is usual in this context, two different datasets are involved with SVM, training and a test set. In the ideal situation the classes are linearly separable. In such situation a line can be found, which splits the two classes perfectly. However not only one line splits the dataset perfectly, but a whole bunch of lines do. From these lines the best is selected as the "separating line". The best line is found by maximizing the distance to the nearest points of both classes in the training set. The maximization of this distance can be converted to an equivalent minimization problem, which is easier to solve. The data points on the maximal margin lines are called the support vectors. Most often datasets are not nicely distributed such that the classes can be separated by a line or higher order function. Real datasets contain random errors or noise which creates a less clean dataset. Although it is possible to create a model that perfectly separates the data, it is not desirable, because such models are over-fitting on the training data. Overfitting is caused by incorporating the random errors or noise in the model. Therefore the model is not generic, and makes significantly more errors on other datasets. Creating simpler models keeps the model from over-fitting. The complexity of the model has to be balanced between fitting on the training data and being generic. This can be achieved by allowing models which can make errors. A SVM can make some errors to avoid over-fitting. It tries to minimize the number of errors that will be made. Support vector machines classifiers are applied in many applications. They are very popular in recent research. This popularity is due to the good overall empirical performance. Comparing the naive Bayes and the SVM classifier, the SVM has been applied the most.

D. Decision Tree

A decision tree partitions the input space of a dataset into mutually exclusive regions, each of which is assigned a label, a value or an action to characterize its data points. The decision tree mechanism is transparent and we can follow a tree structure easily to see how the decision is made. A decision tree is a tree structure consisting of internal and external nodes connected by branches. An internal node is a decision making unit that evaluates a decision function to determine which child node to visit next. The external node, on the other hand, has no child nodes and is associated with a label.

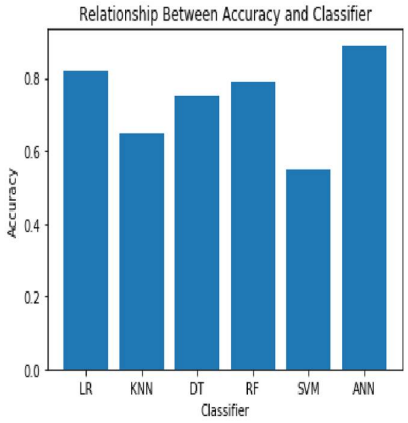
E. K-Nearest Neighbor

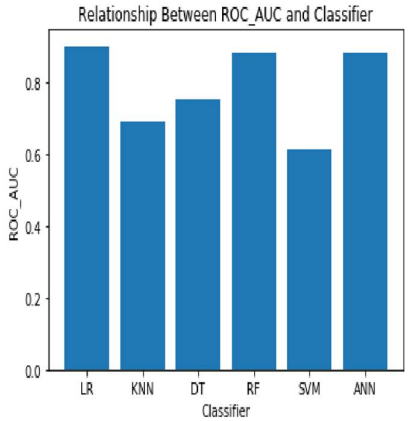
This classifier is considered as a statistical learning algorithm and it is extremely simple to implement and leaves itself open to a wide variety of variations. In brief, the training portion of nearest-neighbour does little more than store the data points presented to it. When asked to make a prediction about an unknown point, the nearest-neighbour classifier finds the closest training-point to the unknown point and predicts the category of that training point according to some distance metric. The distance metric used in nearest neighbour methods for numerical attributes can be simple Euclidean distance. neural networks. Information which flows through the network affects the structure of the artificial neural network because a neural network changes or learns in a sense-based on input and output, for that particular stage and consequently for each stage. ANN's are considered nonlinear statistical data modelling tools where the complex relationships between inputs and outputs are modelled or patterns are found. ANNs have layers that are interconnected. Artificial neural networks are fairly simple mathematical models to enhance existing data analysis technologies

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

Algorithm	Accuracy	Recall	Precision	Roc-Auc
Logistic Regression	0.82	0.77	0.85	0.90
Support Vector Machine	0.55	0.35	0.37	0.61
Decision Tree	0.75	0.76	0.74	0.75
K-Nearest Neighbour	0.65	0.59	0.63	0.69
Random Forest	0.79	0.71	0.85	0.88
ANN	0.90	0.88	0.88	0.89

IV. PERFORMANCE COMPARISONS





V. CONCLUSION

In this paper, we carried out an experiment to find the predictive performance of different classifiers. We select popular classifiers considering their qualitative performance for the experiment. We also choose one dataset from heart available at UCI

machine learning repository. ANN is the best in performance. In order to compare the classification performance of other machine learning algorithms, classifiers are applied on same data and results are compared on the basis of misclassification and correct classification rate and according to experimental results in table , it can be concluded that ANN is the best as compared to Support Vector Machine, Decision Tree and K-Nearest Neighbour.

After analysing the quantitative data generated from the computer simulations, Moreover their performance is closely competitive showing slight difference. So, more experiments on several other datasets need to be considered to draw a more general conclusion on the comparative performance of the classifiers.

REFERENCES

[1] Prerana T H M1, Shivaprakash N C2 , Swetha N3 "Prediction of Heart Disease Using Machine Learning Algorithms- Naïve Bayes,Introduction to PAC Algorithm, Comparison of Algorithms and HDPS" International Journal of Science and Engineering Volume 3, Number 2 – 2015 PP: 90-99 ©IJSE Available at www.ijse.org ISSN: 2347-2200

[2] B.L Deekshatulua Priti Chandra "Classification of Heart Disease Using K- Nearest Neighbor and Genetic Algorithm " M.Akhil jabbar* International Conference on Computational Intelligence: Modeling Techniques and Applications (CIMTA) 2013.

[3] Michael W.Berry et.al,"Lecture notes in data mining",*World Scientific*(2006)

[4] S. Shilaskar and A. Ghatol, "Feature selection for medical diagnosis : Evaluation for cardiovascular diseases," Expert Syst. Appl., vol. 40, no. 10, pp. 4146–4153, Aug. 2013.

[5] C.-L. Chang and C.-H. Chen, "Applying decision tree and neural network to increase quality of dermatologic diagnosis," Expert Syst. Appl., vol. 36, no. 2, Part 2, pp. 4035–4041, Mar. 2009.

[6] A. T. Azar and S. M. El-Metwally, "Decision tree classifiers for automated medical diagnosis," Neural Comput. Appl., vol. 23, no. 7–8, pp. 2387–2403, Dec. 2013. [10] Y. C. T.Bo Jin, "Support vector machines with genetic fuzzy feature transformation for biomedical data classification.,"

[7] N. Esfandiari, M. R. Babavalian, A.-M. E. Moghadam, and V. K. Tabar, "Knowledge discovery in medicine: Current issue and future trend," Expert Syst. Appl., vol. 41, no. 9, pp.4434–4463, Jul. 2014.

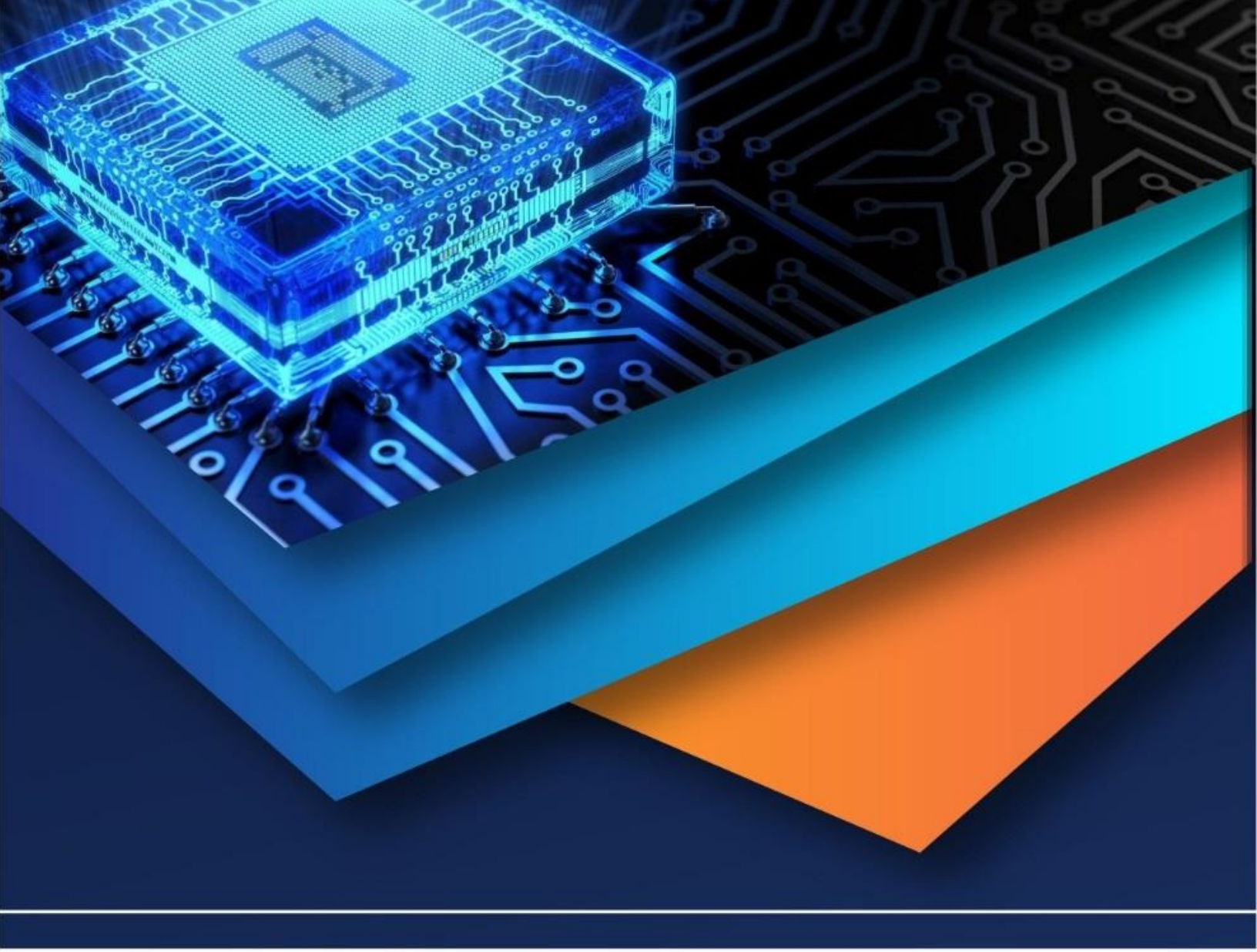
[8] A. E. Hassanien and T. Kim, "Breast cancer MRI diagnosis approach using support vector machine and pulse coupled neural networks," J. Appl. Log., vol. 10, no. 4, pp. 277– 284, Dec. 2012.

[9] Sanjay Kumar Sen 1, Dr. Sujata Dash 21Asst. Professor, Orissa Engineering College, Bhubaneswar, Odisha – India.

[10]. UCI Machine Learning Repository, Available at http://archive.ics.uci.edu/ml/machine-learningdatabases/ statlog/german/

[11] Domingos P and Pazzani M. "Beyond Independence: Conditions for the Optimality of the Simple Bayesian Classifier", *in Proceedings of the 13th Conference on Machine Learning*, Bari, Italy, pp105-112, 1996.

[12] Elkan C. "Naive Bayesian Learning, Technical Report CS97-557", Department of Computer Science and Engineering, University of Califor nia, San Diego, USA, 1997.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)