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Heart Disease Prediction using Machine Learning

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Abstract: *Machine Learning is applied in a variety of fields all* handle. *over the world. The healthcare sector is no exception. Machine Learning can help forecast the existence or absence of locomotor problems, heart disease, and other diseases. In this research, we compare classifiers such as decision trees, KNN, Logistic Regression, and Random Forest and propose an ensemble Regression, and Random Forest and propose an ensemble weak classifiers.*

Keywords: Machine Learning, KNN, Logistic Regression,Decision tree

I. INTRODUCTION

The World Health Organization estimates that heart disease causes 12 million deaths worldwide each year. One of the leading causes of morbidity and mortality among the global population is heart disease. One of the most crucial topics in the data analysis area is predicted cardiovascular disease. Since a few years ago, the prevalence of cardiovascular disease has been rising quickly throughout the world. Numerous studies have been carried out in an effort to identify the most important risk factors for heart disease and to precisely estimate the overall risk.

Heart disease diagnosis is a difficult undertaking that can provide automated predictions about the patient's heart state to improve the effectiveness of subsequent treatment.Heart disease is typically diagnosed based on the patient's indications and symptoms. Several techniques, including K-nearest neighbour (KNN), Support Vector Machine (SVM), Decision Trees (DT), Random Forest (RF), and Logistic regression (LR), are used to categorise the severity of the condition.

II. EXISTING MODELS

In previously employed machine learning models like Decision Trees, we start from the root of the tree to predict a class label for a record. We contrast the root attribute's values with that of the attribute on the record. We follow the branch that corresponds to that value and go on to the next node based on the comparison. The value of the attributes in the dataset is also explained by the decision tree. They also made use of the Cleveland data collection. Using some techniques, the data set is divided into 70% training and 30% testing. 91% of the time, this method is accurate.While KNN works by calculating the distances between a query and each example in the data, choosing the K examples that are closest to the query, and then voting for the label that is used the most frequently. Thus KNN gave us better results compared to others by more than 92% accuracy.

1.1 Objectives

The objectives of the project are as follows:

- To identify complex patterns in user data and then predict outcomes based on those patterns to respond to business inquiries and address business concerns.
- To analyze the data and find trends with the use of machine learning.
- To create a method for predicting cardiac disease.
- To develop a code for heart disease prediction.
- To analyze data for effectiveness and precision of present procedure.

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III. LITERATURE SURVEY

Heart Disease Prediction using ML (Mr. Santhana Krishnan. J, Dr. Geetha S)

In this system, a heart disease data set is used. The main aim of this system is to predict the possibilities of 91% occurring heart disease of the patients in terms of percentage. This is performed through data mining classification techniques.

Heart Disease Prediction using ML (Hassan, C.A.u.; Iqbal, J.; Irfan, R.; Hussain, S.; Algarni, A.D.; Bukhari, S.S.H.; Alturki, N.; Ullah, S.S.)

Effectively Predicting the Presence of Coronary HeartDisease Using Machine Learning Classifiers.

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IV. METHODOLOGY

1 Collection of dataset:

We first gather data for our technology that forecasts cardiac illness. We divided the dataset into training and testing data after it was collected.

The learning of the prediction model takes place on the training dataset, and the evaluation of the prediction model occurs on the testing dataset. 30% of the data are utilised for testing in this project, while 70% are used for training.

Heart Disease UCI served as the project's data source. The dataset has 76 properties, of which the system uses 14 for its operation..

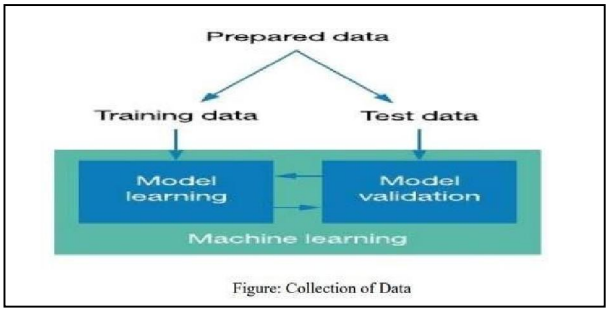

Figure: Collection of Data

2 Selection of attributes:

The choice of acceptable attributes for the prediction system is included in attribute orfeature selection.

This is done to make the system more effective. For the prediction, a number of patient characteristics are used, including gender, the nature of the patient's chest discomfort, fastingblood pressure, serum cholesterol, and exang.

For this model's attribute selection, thecorrelation matrix is used.

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3. Pre-processing of Data :

The pre-processing of data is a critical stage in thedevelopment of a machine learning model.
Data that isn't initially clean or in the model's required format can lead to inaccurate results. Pre-processing involves transforming data intothe format we need. It is used to handle the dataset's noise, duplication, and missing values.
Activities like importing datasets, partitioning datasets, attribute scaling, etc. are all part of datapre-processing.
Preprocessing the data is necessary to increasethe model's accuracy.

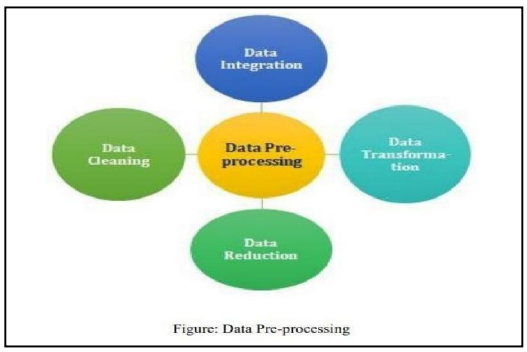
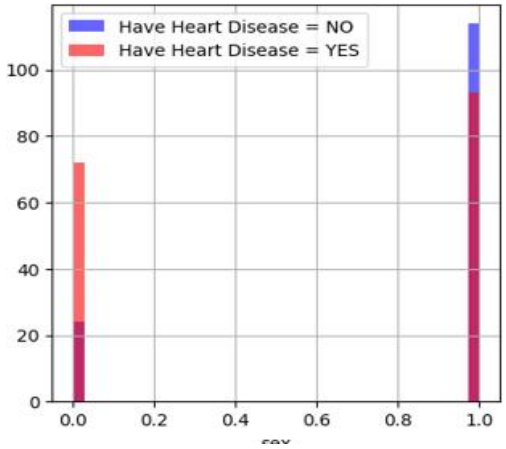


Figure: Data Pre-processing

4. Balancing of Data

There are two approaches to balance unbalanced datasets. They are both under- and over-sampling.
Under Sampling: In Under Sampling, the size of thelarge class is reduced in order to balance the dataset.
When there is enough data, this process is taken intoaccount.
Over Sampling: In Over Sampling, the size of the scarce samples is increased in order to balance thedataset.
When there is not enough data, this process is takeninto account



5. Prediction of Disease

For classification, a variety of machine learningtechniques are utilized, including SVM, Naive Bayes, Decision Trees, Random Trees, LogisticRegression, Ada-boost, and Xg-boost.
Algorithms are compared, and the algorithmthat predicts heart disease with the best degree of accuracy is chosen.

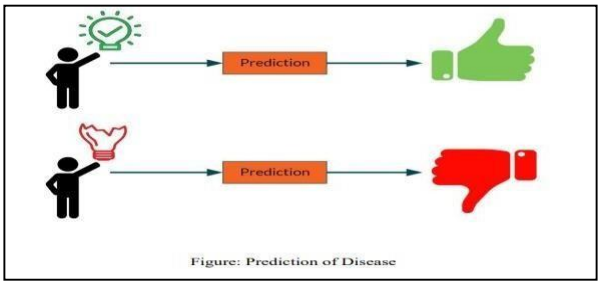


Figure: Prediction of Disease

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IV. RESULT AND CONCLUSIONS

The project is created with the help of python programming, machine learning.
The model is trained with 300 patient's data and 14 different parameters .The model has accuracy of 95% using KNN.
The project helps in detection of heart disease of thepatient using his medical data provided by the doctor

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[1]. Heart Disease Prediction using ML(Mr. Santhana Krishnan.J, Dr.Geetha S) In this system, a heart disease data set is used. The main aim of this system is to predict the possibilities of 91% occurring heart disease of the patients in terms of percentage. This is performedthrough data mining classification techniques.
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