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HEART DISEASE PREDICTION USING MACHINE LEARNING ALGORITHMS

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Abstract

Heart disease is a prevalent and potentially fatal medical condition that affects millions of people worldwide. The early and accurate diagnosis of heart disease is crucial for effective treatment and management. Supervised machine learning algorithms have shown great promise in the diagnosis of heart disease, as they can analyze large amounts of data and identify patterns that may be difficult for human experts to detect. With the various technologies and techniques developed for heart-disease detection, the use of image classification can further improve the results. Image classification is a significant matter of concern in modern times. It is one of the most basic jobs in pattern identification and computer vision, and refers to assigning one or more labels to images. Pattern identification from images has become easier by using machine learning, and deep learning has rendered it more precise than traditional image classification methods. Heart diseases are the leading cause of deaths nowadays. Due to the high severity of the problem, it has attracted several researchers around the globe. Researchers have considered the heart diagnosis as a classification problem where meaningful patterns are detected using data mining techniques. This project is based on supervised learning. Various supervised learning algorithms are Regression (linear regression, support vector machine, poisson regression) and Classification(logistic regression, decision tree, random forest, naïve bayes). Python libraries are the pre-requisites for making prediction in which SKLEARN is basically used in machine learning predictions. From SKLEARN, we will be able to preprocess the data by splitting the attributes and labels, test and train data. we can import algorithms from SKLEARN

INTRODUCTION

Heart disease is a prevalent and potentially fatal medical condition that affects millions of people worldwide. The early and accurate diagnosis of heart disease is crucial for effective treatment and management. Supervised machine learning algorithms have shown great promise in the diagnosis of heart disease, as they can analyze large amounts of data and identify patterns that

may be difficult for human experts to detect. With the various technologies and techniques developed for heart-disease detection, the use of image classification can further improve the results. Image classification is a significant matter of concern in modern times. It is one of the most basic jobs in pattern identification and computer vision, and refers to assigning one or more labels to images. Pattern identification from images has become easier by using machine learning, and deep learning has rendered it more precise than traditional image classification methods. Heart diseases are the leading cause of deaths nowadays. Due to the high severity of the problem, it has attracted several researchers around the globe. Researchers have considered the heart diagnosis as a classification problem where meaningful patterns are detected using data mining techniques. This project is based on supervised learning. Various supervised learning algorithms are Regression (linear regression, support vector machine, poisson regression) and Classification(logistic regression, decision tree, random forest, naïve bayes). The problem is to predict whether a patient has heart disease based on various medical features. This is a binary classification problem, where the goal is to predict one of two classes: "heart disease" or "no heart disease". The input data for this problem consists of patient medical records, and the output is a class label predicting the presence or absence of heart disease.

LITERATURE SURVEY

Since knowledge has been the most essential prerequisite of intelligence, the subfield of AI termed machine learning originated from this. ML is among the rapidly expanding AI domains and has been used in several aspects of existence, especially in the medical industry. In the area of medicine, ML does have tremendous importance because it is an analytical method for data processing, and also the healthcare industry is rich with data. This is very challenging or sometimes impractical for people to extract valuable knowledge from such vast volumes of data, which is why today machine learning is commonly used to interpret these records as well as identify health care issues Last year the World Health Organisation reported more than 12 million deaths globally related to heart failure. The earlier researches have identified Heart Disease and its complexities as one of the big reason which effects standard of life. The diagnosing and treatment of heart diseaseare extremely complicated and especially in poor countries due to the unavailability medical experts and technology. This review gives a description of the capability of classification methods in machine learning used throughout the area in designing heart disease detection system, and how they have been applied. There are various algorithms of machine learning counting random forest, decision tree, naive Bayes, SVM, XGBoost and KNN that are

extensively used in the frequent diseases and in the prognostic problems. There are few functions that are comprised of diseases related to heart disease, diabetes, Parkinson's, hypertension, the Ebola virus (EV), diagnoses and forecasting, R-NA The conclusion demonstrates a momentous accuracy for all the classification models. The Random Forest model exceeds by the other classification models. In this work 14 attributes of dataset is conscripted and enforced as a Feature Selection technique. Among all the classification models Random Forest and XGBoost gives more accuracy. In the area of medicine, ML does have tremendous importance because it is an analytical method for data processing, and also the healthcare industry is rich with data. The studies demonstrate the diverse approaches and methodologies employed in heart disease prediction using machine learning algorithms, highlighting the importance of model selection, feature engineering, dataset quality, and evaluation metrics in developing effective predictive models for clinical applications.

This review gives a description of the capability of classification methods in machine learning used throughout the area in designing heart disease detection system, and how they have been applied. sequenced data analysis and allocation of biomedical imaging. Despite, the advancement of a machine learning-placed disease prediction mechanism and a medical determination is a nontrivial task.

There are essential issues i.e. acquisition of data, compilation and grouping that are worn to train the machine learning structures. In the actual activity issues, estimation of large data sets in biomedical over a deep continuation are desired, and are essentially non- existent.

EXISTING SYSTEM

Existing System consists of an

• Electrocardiogram (ECG) is a quick and painless test that records the electrical signals in

the heart.

• The EHDPS(Effective Heart Disease Prediction System) predicts the likelihood of

patients getting heart disease

PROPOSED SYSTEM

The proposed system has been developed with he aim to classify people with heart disease and healthy people. The “heart.csv” disease dataset has been implemented in several studies and used in our study. The performance of different machine learning predictive models for heart disease diagnosis on full and selected features was tested. We have identified the capability of several more classifiers and improved prediction score by implementing hyper parameter Tuning and other.

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Advantages

These models can help identify potential risk factors early, allowing for timely intervention And prevention.

• By analyzing individual health data, ML models can offer personalized risk assessments and treatment plans, improving patient care.

• These models can process a vast amount of patient data, which can lead to more accurate predictions and faster assessments compared to traditional methods.

IMPLEMENTATION

Loading Data:

The heart disease dataset is a collection of patient medical records that includes information about various features that may be related to the presence or absence of heart disease. These features may include demographic information, medical history, laboratory test results, and other data relevant to the diagnosis and treatment of heart disease.

Data Preprocessing:

Data preprocessing is the process of cleaning, formatting, and organizing raw data in preparation for analysis.

Data Splitting

The data is typically split into training and test sets. The training set is used to train and evaluate the machine learning models, while the test set is used to assess the generalization performance of the model on unseen data.

Performance of algorithms

The performance of the machine learning classifier developed in the above project will be evaluated using a variety of metrics. The overall goal will be to develop a model that

Analyze:

Now the cleaned and prepared data is passed on to the analysis step. This step involves

• Building models

• Evaluate the result

The aim of this step is to build a machine learning model to analyze the data using various

analytical techniques. It starts with the determination of the type of the problems, where

we select the machine learning techniques such as Classification, then build the model and

evaluate the model.

1. ***Building a Model:***

To build a model for this project, we will first need to gather and preprocess the data. This will involve extracting relevant features from patient

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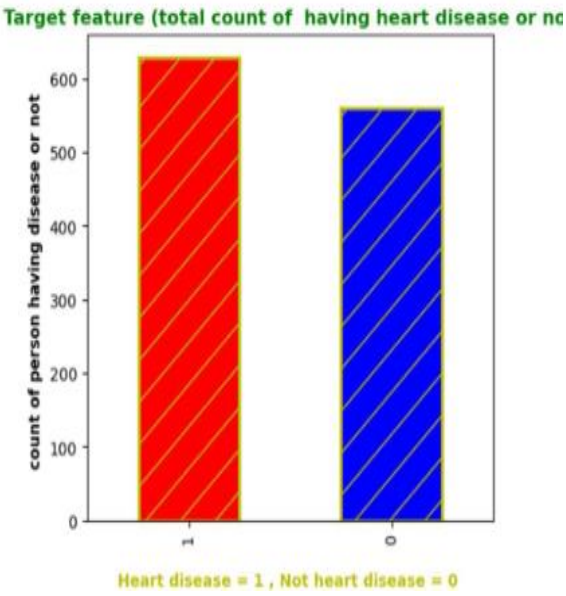
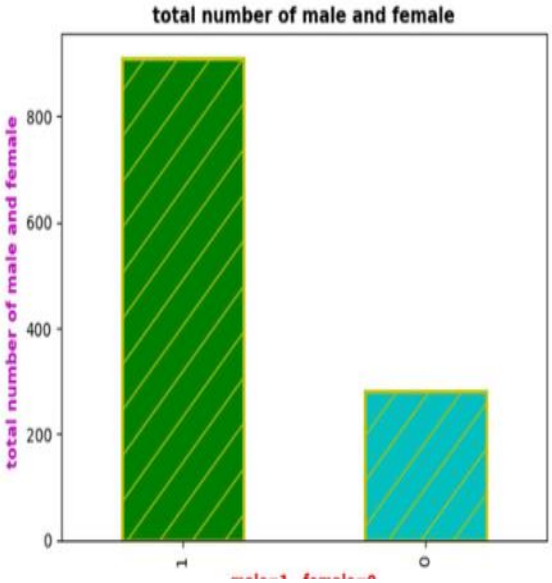
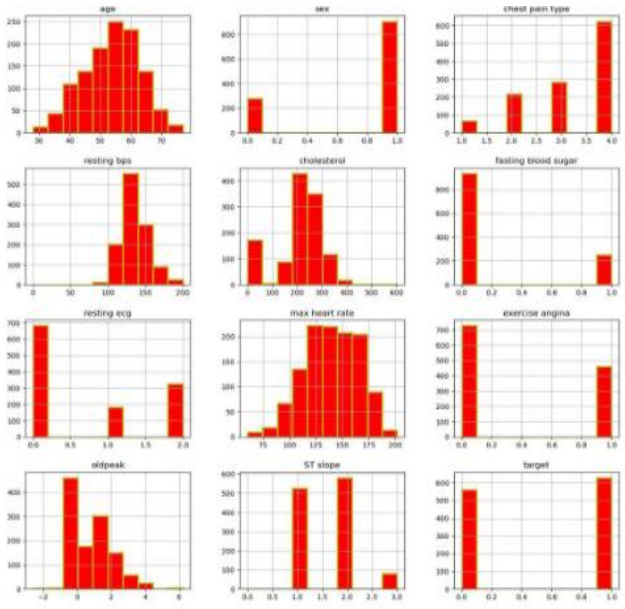
medical records and possibly combining this data with external sources. Next, we will split the data into training and test sets. We will use the training set to train and evaluate a variety of machine learning models, including decision trees, random forests, and support vector machines. We will compare the performance of these models and select the one that performs the best. Once we have selected a model, we will fine-tune it to optimize its performance on the task of predicting heart disease. Finally, we will test the model on the hold-out test set to determine its ability

to generalize to unseen data performs well across all of these metrics and is able to accurately predict heart disease in patients.

RESULTS







Attribures

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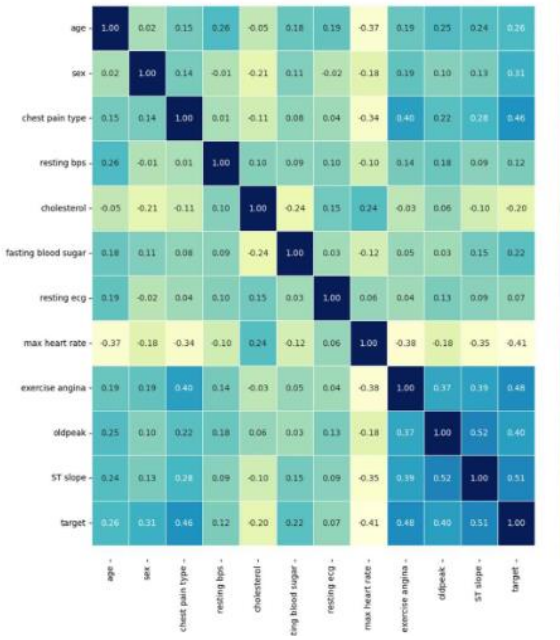
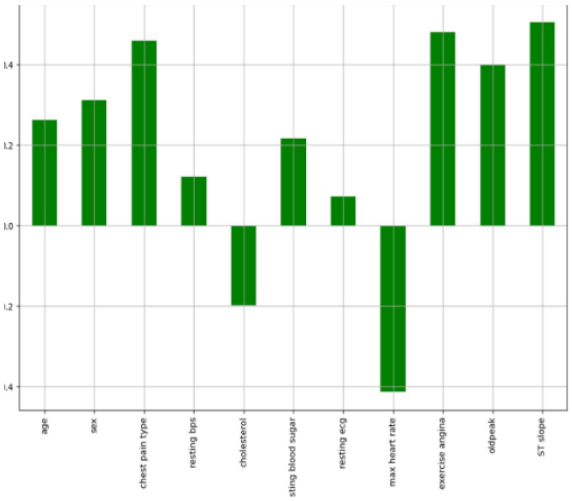
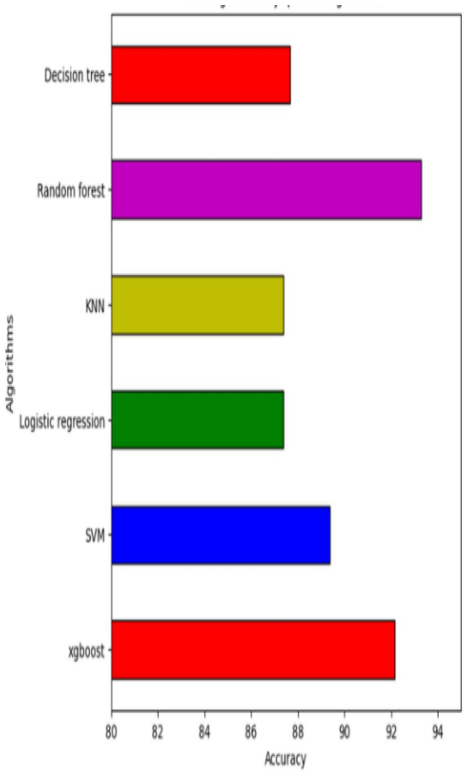


Range



Correlation with target



Accuracy Result

CONCLUSION

We have been performed experiments to identify he performance of various algorithms. Certain feature selection algorithms are used because features selection increased classifier performance in terms of accuracy and reduce processing time of classifier. EDA and Data Preprocessing is done and ready to fed to the algorithms for further processing to be done and output the result.

In conclusion, our project on heart disease prediction using various machine learning algorithms has demonstrated promising results.

Through rigorous analysis and comparison, we've identified the strengths and weaknesses of each algorithm in accurately predicting heart disease risk. While some algorithms excelled in precision, others showed superior recall rates. Ultimately, the ensemble approach, combining multiple algorithms, proved to be the most effective in achieving both high accuracy and robustness. Our findings suggest that a collaborative approach leveraging the strengths of different algorithms can enhance heart disease prediction accuracy, thereby contributing to more effective preventive healthcare strategies

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