Designing a Web application for Prediction of cardiovascular disease using Machine Learning Techniques

Alternate title: Improving the accuracy in the prediction of cardiovascular heart disease using machine learning algorithms.

Aim:

To apply machine learning techniques resulting in improving the accuracy in the prediction of cardiovascular disease.

Objective :

The main objective of this project is a build web application for the prediction of heart disease using Machine learning. After analysis and comparison of various ML algorithms, the one having highest accuracy will be implemented for prediction purpose.

Synopsis:

Heart disease is one of the most significant causes of mortality in the world today. Prediction of cardiovascular disease is a critical challenge in the area of clinical data analysis. Machine learning (ML) has been shown to be effective in assisting in making decisions and predictions from the large quantity of data produced by the healthcare industry. We have also seen ML techniques being used in recent developments in different areas of the Internet of Things (IoT). Various studies give only a glimpse into predicting heart disease with ML techniques. In this method, we propose a novel method that aims at finding significant features by applying machine learning techniques resulting in improving the accuracy in the prediction of cardiovascular disease. The prediction model is introduced with different combinations of features and several known classification techniques.

Existing System:

The obtained results are compared with the results of existing models within the same domain and found to be improved. The data of heart disease patients collected from the UCI laboratory is used to discover patterns with NN, DT, Support Vector machines SVM, and Naive Bayes. The results are compared for performance and accuracy with these algorithms. The hybrid method returns results of 86:8% for *F*-measure, competing with the other existing methods.

Proposed System

We have used python and pandas operations to perform heart disease classification of the Cleveland UCI repository. It provides an easy-to-use visual representation of the dataset, working environment and building the predictive analytics. ML process starts from a pre-processing data phase followed by feature selection based on data cleaning, classification of modeling performance evaluation, and the results with improved accuracy. The K nearest Neighbour method returns results of 89:5% for *F*-measure, competing with the other existing methods.

Module Description:

- Data Pre-Processing
- Feature Selection And Reduction
- Classification Modeling
- Performance Measures

Data Pre-Processing

Heart disease data is pre-processed after collection of various records. The dataset contains a total of 903 patient records, where 6 records are with some missing values. Those 6 records have been removed from the dataset and the remaining 897 patient records are used in pre-processing.

Feature Selection and Reduction

From among the 13 attributes of the data set, two attributes pertaining to age and sex are used to identify the personal information of the patient. The remaining 11 attributes are considered important as they contain vital clinical records. Clinical records are vital to diagnosis and learning the severity of heart disease.

Classification Modeling

The clustering of datasets is done on the basis of the variables and criteria of Decision Tree (DT) features. Then, the classifiers are applied to each clustered dataset in order to estimate its performance. The best performing models are identified from the above results based on their low rate of error.

- Decision Trees Classifier
- Support Vector Classifier
- Random Forest Classifier
- K- Nearest Neighbour

Performance Measures:

Several standard performance metrics such as accuracy, confusion matrix, precision and recall, error in classification have been considered for the computation of performance efficacy of this model.

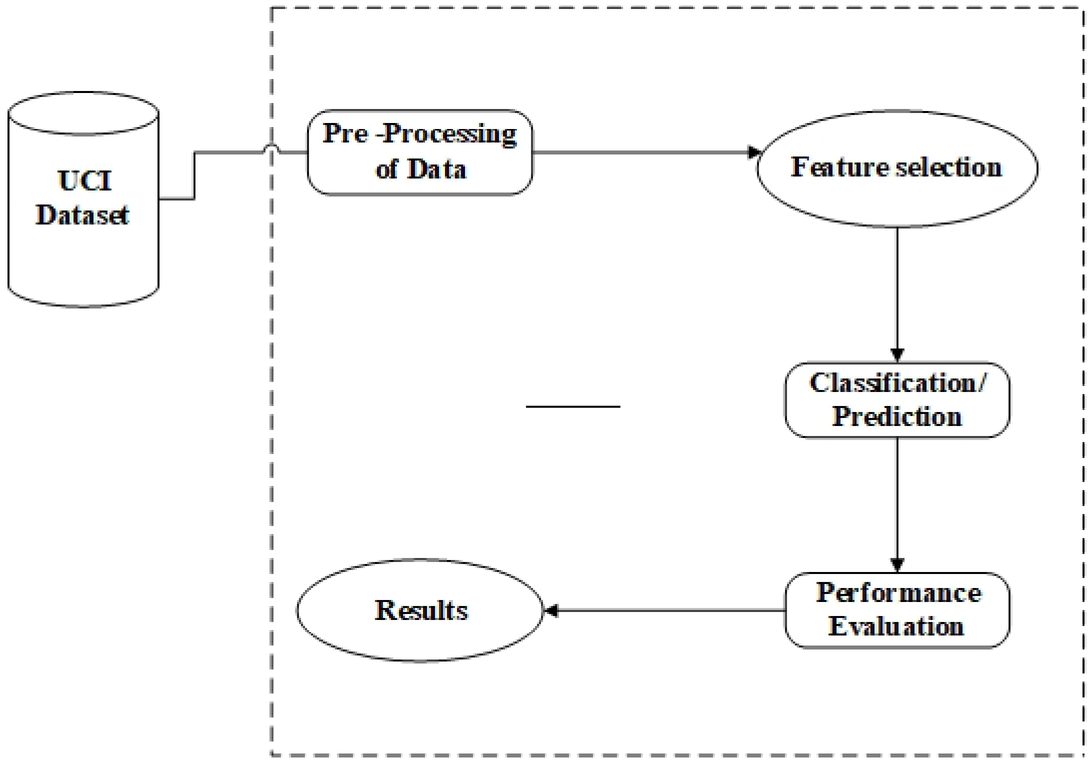
Software Requirements:

✓	Operating System	:	Windows 7 , 8, 10 (64 bit)
✓	Software	:	Python 3.7
✓	Tools	:	Anaconda (Jupyter Note Book IDE)

Hardware Requirements:

Hard Disk	:	500GB and Above
RAM	:	4GB and Above
Processor	:	I3 and Above

Architecture Diagram:


UCI Dataset
Pre -Processing of Data
Feature selection
Classification/ Prediction
Performance Evaluation
Results