Prediction of Heart Disease using Machine Learning

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Abstract

An electrocardiogram (ECG) is an important diagnostic tool for the assessment of cardiac arrhythmias in clinical routine. In this process, we introduce the a deep learning based convolution neural network framework, which is previously trained on a general signal data set is transferred to carry out automatic ECG arrhythmia diagnostics by classifying patient ECG's into corresponding cardiac conditions. The Main focus of this process is to implement a simple, reliable and easily applicable deep learning technique for the classification of the selected two different cardiac categories conditions. The results demonstrated that the transferred deep learning classification cascaded with a conventional back propagation neural network were able to obtain very high performance rates.

Keywords- Heart Disease, Machine Learning, ECG, deep learning classification.

I. INTRODUCTION

Any well-defined research problem is predestined that it has been solved partially. So it is necessary to clearly state and define the problem unambiguously for providing better solutions. Machine Learning algorithms provide the facility to find new facts in the form of patterns from the history of records stored in databases. Predicting the diseases in earlier stages is a major task of data mining algorithms.

The number of costly tests is required for patients to analyze the symptoms and causes for effective disease diagnosis. On the other hand, this number of tests on patients can be eliminated using data mining machine learning algorithms. This minimizes number of tests which plays considerable outcomes in time and accuracy level of prediction. Heart disease prediction is essential since it permits healthcare professionals to analyze the attributes important for diagnosis like blood pressure, diabetes, age, height, weight, etc., effectively.

Even there are many existing data mining algorithms used in the medical industry, the research needs to be done on performance evaluation of such classification techniques to refine and tune the

Accuracy level. The research focused is to address the challenges of improving the prediction models to predict the heart disease by providing timely response among the choice of the best. This research proposes to address and solve the challenges of enhancing the predicting accuracy of heart disease in right time. The research tasks are defined as the way by (i) how data mining algorithms can be used in the medical industry to identify their performance in prediction? (ii) How do the classification techniques help exactly in developing the prediction model so as to predict accurately the risk of heart disease?

Nowadays, data stored in medical databases are growing at an increasingly rapid rate. It has been widely recognized that medical data analysis can lead to an enhancement of health care. The primary objective of this research work is the effective design of a prediction system by enhancing the classification algorithm. Enhancement can be achieved by modifying necessary components to predict the chance of getting heart disease in earlier stages. It also shows that data mining can be applied to the healthcare databases to predict or classify the data with realistic accuracy.

II. METHODOLGY

The heart signals are taken from ECG, which is known as Electrocardiography. That the heart signals are picked by using electrodes in arms, leg, chest of our body. By using this signal heart disorder can be find out. Depend on the shape of the ECG waveform, find out the cardiac health. ECG signal readings and their analysis are carried out from signal processing. Today signal processing plays a major role in ECG signal analysis and interpretation. The aim of ECG signal processing is diverse and comprises the Improvement of measurement accuracy and reproducibility (when compared with manual measurements) and by taking out the information is not readily available from the signal through visual assessment.

1.Proposed System

In this process, we propose a deep arrhythmia-diagnosis method, base on four classification model, to automatically detect the abnormality of the heartbeats using the ECG signals. This classification model mainly consists of four convolution layers: two BLSTM layers and two fully connected layers. The datasets of RR intervals (called set A) and heartbeat sequences (P-QRS-T waves, called set B) are fed into the above-mentioned model. Most importantly, our proposed approach achieved favorable performances with an accuracy of the training and validation set of set A, respectively. In the testing set (unseen data sets), we obtained an accuracy, a sensitivity and a specificity.

2. Advantages

The main advantage of the multi SVM compared to other classifiers is mainly on the reduction of the cross validation and post optimization functions.
SVM produces better classification results comparing to other classifiers mainly due to the global optimization functions included. SVM has shown a good concert in classification.
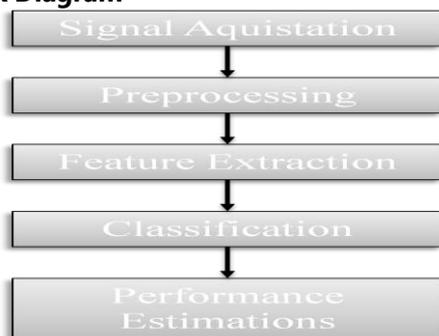
3. Block Diagram

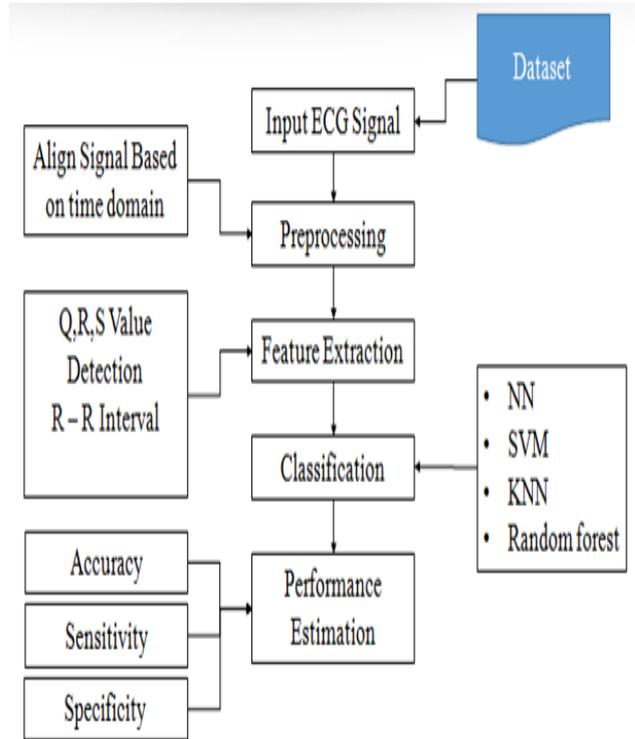**Figure1:** block Diagram of proposed work.

Figure 2: Flow Diagram of proposed work.

III. RESULT

The main objective of the proposed research is the prediction of heart diseases using machine learning techniques KNN, ANN, Random Forest and SVM. In this proposed work there are five stage that is signal acquisition, preprocessing, feature extraction, Classification and performance estimation. The KNN, ANN, Random Forest and SVM algorithms is used and the health care data which classifies the patients whether they are having heart diseases or not according to the information in the record. Also I will try to use this data a model which predicts the patient whether they are having heart disease or not.
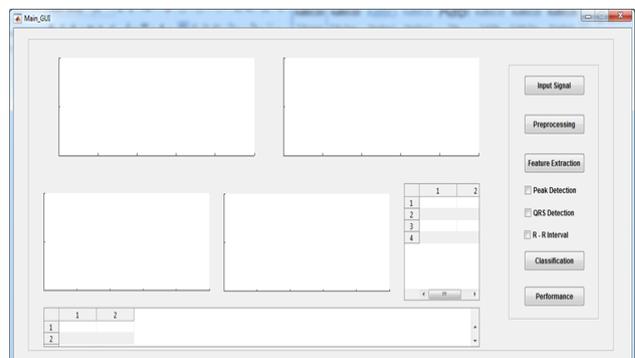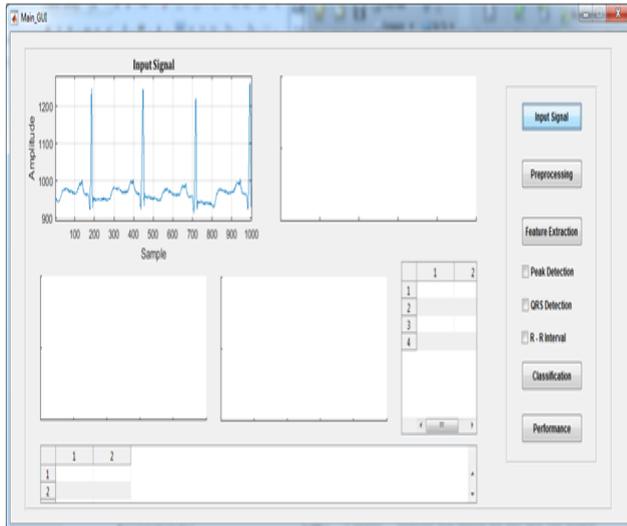

Figure 3: Main GUI Window of proposed work.

The above figure shows the main MATLAB GUI window of proposed work. In this window shows the there are five stage is signal acquisition, preprocessing, feature extraction, Classification and performance estimation.
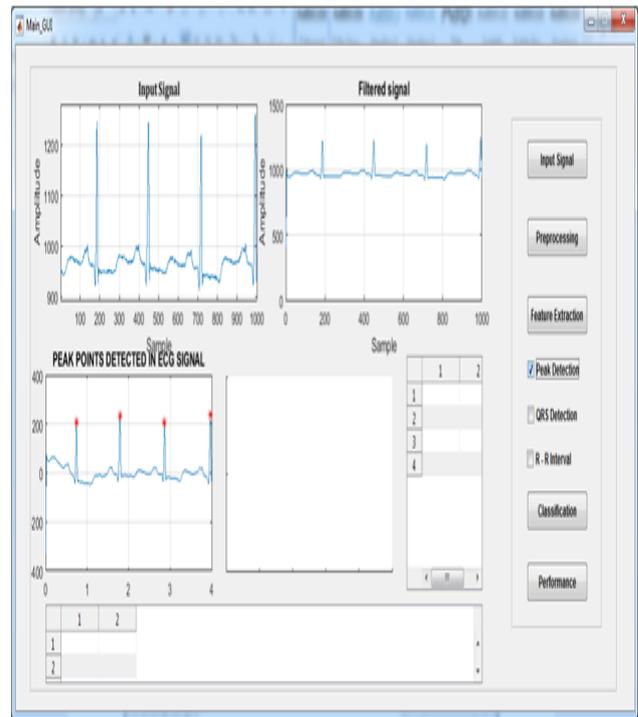

Figure 4: Take Input Signal Show.

This above figure shows the click on the input signal button and takes the input signal from the dataset. This stage is called signal acquisition.
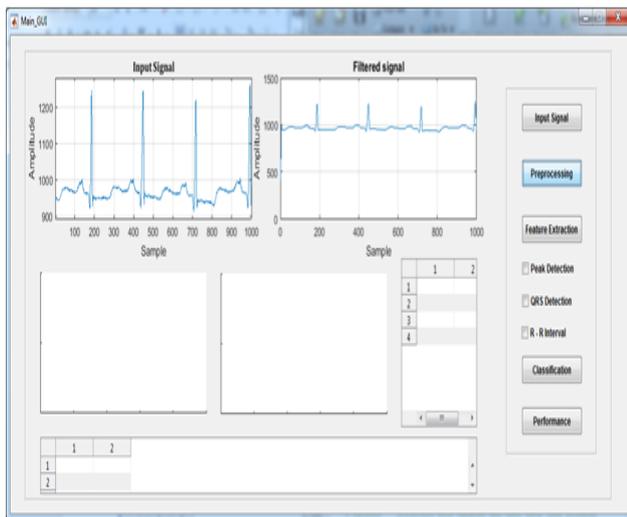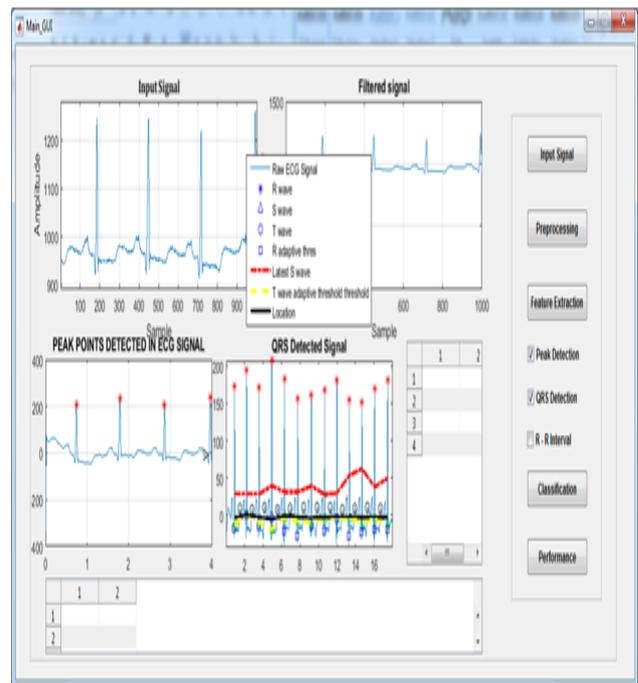

Figure 5: Preprocessing Stage.

The above figure shows the preprocessing method. After take the input signal then applied preprocessing method and then gets the filtered signal.

Figure 6: Feature Extraction.

The above figure shows the extract the feature of filtered signal. In the feature extraction method firstly extract the peak point detection.

Figure 7: Feature extraction of QRS.

The above figure shows the extraction of features of filtered signal. In the feature extraction method secondly extracts the QRS detected signal.
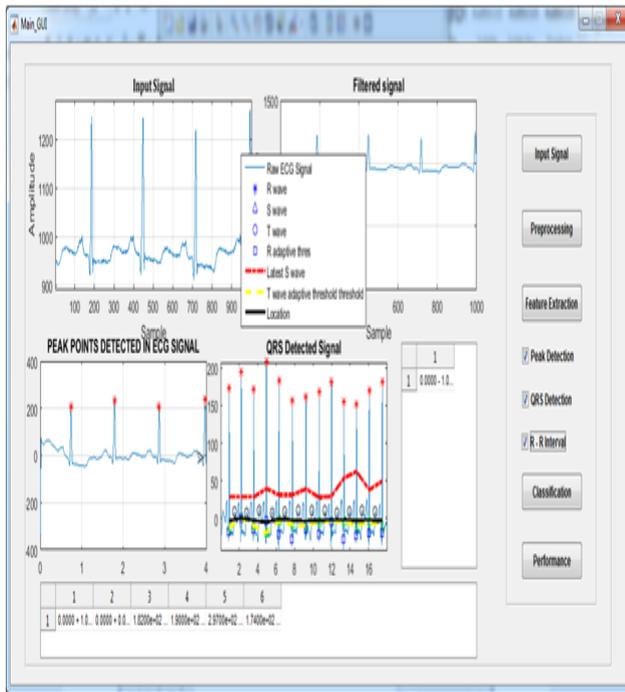
Figure 8: Feature Extraction of Interval.

The above figure shows the feature extraction of R.R interval. In the feature extraction method lastly extracts the R. R interval.
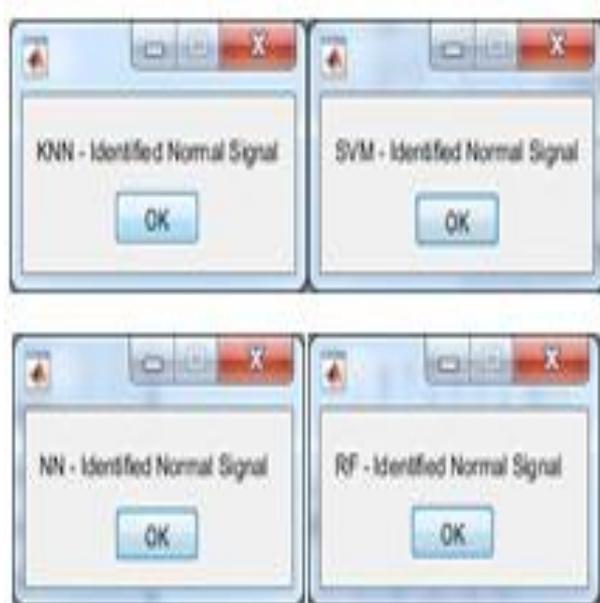

Figure 9: Classification Stage.

The above figure shows the classification method. In this method there are four algorithm used like KNN, SVM, NN and RF algorithm. This method known is classification method.
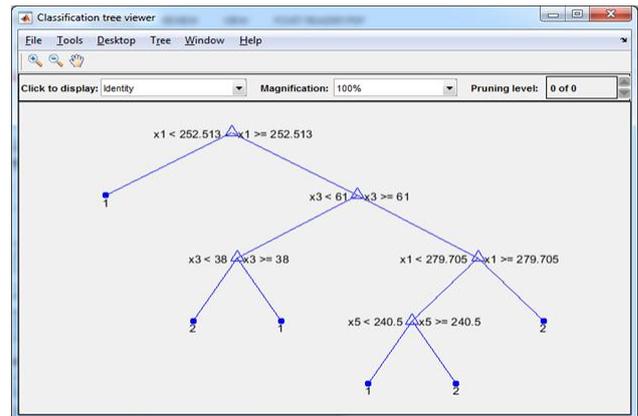

Figure 10: Classification tree viewer.

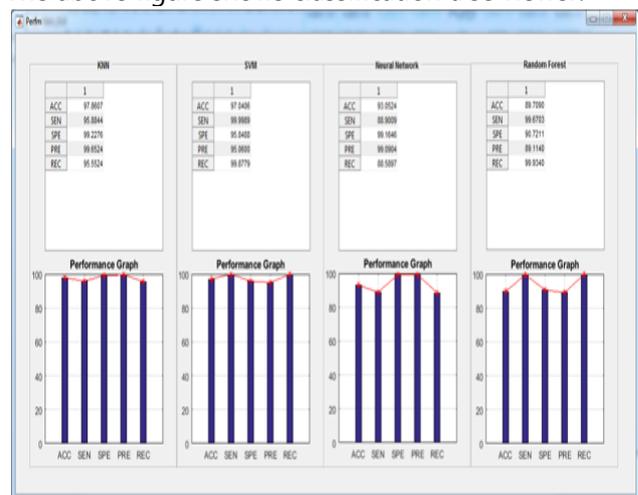The above figure shows classification tree viewer.

Figure 11: performance Estimation.

IV. CONCLUSION

The amount of Heart diseases can exceed the control line and reach to maximum point. Heart disease are complicated and each and every year lots of people are dying with this disease By using this all systems one of the major drawbacks of these works is mainly focus only to the application of classify techniques and algorithms for heart disease prediction, by all these studying various data cleaning and mining techniques that prepare and build a dataset appropriate for data mining.

So that I can use this Machine Learning in that SVM, KNN, NN AND RF algorithms by predicting if patient has heart disease or not. Any nonmedical employee can use this software and predict the heart disease and reduce the time complexity of the doctors. An electrocardiogram (ECG) is an important diagnostic tool for the assessment of cardiac arrhythmias in clinical routine. In this process, we introduce the a

deep learning based convolution neural network framework, which is previously trained on a general signal data set is transferred to carry out automatic ECG arrhythmia diagnostics by classifying patient ECG's into corresponding cardiac conditions. The Main focus of this process is to implement a simple, reliable and easily applicable deep learning technique for the classification of the selected two different cardiac categories conditions. The results demonstrated that the transferred deep learning classification cascaded with a conventional back propagation neural network were able to obtain very high performance rates.

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