JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

LSTM MODEL FOR THE DETECTION OF CHRONIC HEART FAILURE FROM HEART SOUNDS

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Abstract : The purpose of this paper is to identify the failure condition of the heart from the heart sounds. The suggested method applies the LSTM(Long Short Term Memory) model for the detection. Through this, the process of detection of heart failure becomes automated. Here a combined form of traditional machine learning and deep learning is used for delivering the abnormality prediction with an accuracy rate of 98%. The recent Physionet dataset is used from which 80% of data is used to train the model and the remaining 20% is used as test data. The input to the model is a recorded PCG(Phonocardiograph) and the output gives either of the two predictions that is normal or abnormal. Sometimes even the expert doctors fails to detect the variations normal working of heart,but the PCG signals do depict the variations. Proposed model can detect the abnormal condition even before the stage in which it becomes clinically evident thereby decreasing the chances of worsening of the disease. So the patient gets timely care and treatments to safeguard his life.

I. INTRODUCTION

Globally, 20% of the people older than 65 years and 5-7% of total population are already affected with chronic heart diseases. Patients require to get hospital appointments and then need to visit doctors multiple times with different test results for the timely detection of any abnormalities or unhealthy working condition of their heart. Most of such detections gets too late either because of the lazy approach of the patient towards the ill state or by the doctor's fault. In such situations the patients can rely on this system where they don't have to wait for getting a doctor's appointment for the detection and there is no dely of clinical procedures. That really helps to reduce the healthcare social and financial burdens. When it is comes about health the accuracy rate is more important and we can not miss the factor. Since this model is using the LSTM model for the detection it is ensuring more than 98% accuracy rate with more fast prediction than all the existing systems.

II. LITERATURE SURVEY

Article[1] proposed a novel and highly-effective method for CHF detection based on CNNs. Compared to existent modelsthe added value of this model is that it uses raw ECG signals, ratherthan HRV features, and yields prominent accuracy in detecting CHF. Indeed, showed that the performance of the CNN model holds considerably high scores when the classification is performed at the heartbeat level, and it is error-free as pertains the subject classification component. Moreover, this is the first study using advanced machine learning approaches to reveal which morphological characteristics of the ECG beats are the most important to efficiently detect CHF. They believe that this is a crucial contribution for clinical practice because clinicians, who are ultimately responsible for CHF patients, are generally refractory to the adoption of methods that are not fully transparent in showing how certain decisions were reached.

Paper [2] explore the possibilities of detecting heart failure worsening based on heart sounds using machine-learning methods. First, we developed a method that distinguishes between healthy individuals and those with a decompensated CHF episode. Our method includes filtering, segmentation, feature extraction, and machine learning, and was tested with a leaveone- subject-out evaluation technique on the data from 193 individuals. The method achieved 82% accuracy, outperforming the baseline classifier for 14 percentage points. In the next stage, we explored the differences between decompensated and recompensated states of CHF patients.

Analyzing ECG is an important method for identifying abnormalities in heart function. Early detection of heart diseases are still a challenging task for many researchers but with DL, ML, CAD, SVD, and PCA etc., methods, an automated detection of heart conditions with ECG analysis and classification become possible. This review paper provide an in-depth evaluation of various traditional and machine learning methods used in each stage of ECG signal analysis, with a focus on the ECG classification task. Many researchers used

deep learning techniques which demonstrate more efficient detection and classification results compared to others. A wide range of hardware and software tools for this research area have also been described. The study helps in identifying heart disorder from retinal fundus image and this can be further examined by physicians for better diagnosis.

III. METHODOLOGY

The system mainly contails 3 buttons in the frontend. When the Image button is clicked control will go to file browser where we can choose the PCG wave image to be analysed. The chosen file image will be opened in the window ,then we can click Predict button for the prediction to carry out based on the trained model. Once the prediction is completed and the result is displayed we can exit by clicking Close.

The data visualization module refers to the process of visually representing the data to gain insights, understand patterns, and make decisions. This has crucial role in understanding the data, evaluating the model, and communicating results effectively. The available dataset is analysed to find the mean value, threshold value, and peak value and is plotted using the plot function in the matplotlib library. The Heart rate variability(HR variability) refers to the variation in the time interval between consecutive heartbeats(Simply the number of beats). High HRV indicates a healthy cardiovascular system and good autonomic nervous system function. Low HRV is associated with aging, stress, and certain medical conditions such as diabetes and heart disease. This is then passed to the LSTM model and there the prediction takesplace and the result is displayed to the user.

IV. CONCLUSION

A successful system with expected range of accuracy and efficiency is obtained which combines the machine learning and deep learning features for the detection of heart failure from phonocardiogram(PCG). More than five publically available PhysioNet dataset is used to train and test the model. Developing the system includes collecting the data and training the system. The literature survey gives a clear idea of the existing systems. From this it is very obvious that the proposed work is economically, socially and technically feasible. This gives a solid background for the proposed system.

V. REFERENCES

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