ANALYSIS OF DIGITALIZED ECG SIGNAL BASED ON ARTIFICIAL INTELLIGENCE AND CLASSIFICATION OF AUTOMATED ECG USING DEEP LEARNING

INTRODUCTION:

As cardiovascular diseases (CVDs) are a serious concern to modern medical science to diagnose at an early stage, it is vital to build a classification model that can effectively reduce mortality rates by treating millions of people in a timely manner. An electrocardiogram (ECG) is a specialized instrument that measures the heart's physiological responses. To accurately diagnose a patient's acute and chronic heart problems, an in-depth examination of these ECG signals is essential. The proposed model consists of a convolutional neural network having three convolutional, two pooling, and two dense layers. The proposed model is trained and evaluated on the MIT-BIH arrhythmia and PTB diagnostic datasets. The classification accuracy is 99.16%, which is higher than state-of-the-art studies on similar arrhythmias. Recall, precision, and F1 score of the proposed model are 96.53%, 95.15%, and 99.17%, respectively. The proposed model can aid doctors explicitly for the detection and classification of arrhythmias.

LITERATURE REVIEW:

[1]. Arrhythmias are defined as irregularities in the heartbeat rhythm, which may infrequently occur in a human's life. These arrhythmias may cause potentially fatal complications, which may lead to an immediate risk of life. Thus, the detection and classification of arrhythmias is a pertinent issue for cardiac diagnosis

Advantages:

The results obtained are better as compared to the other existing techniques and will greatly reduce the amount of intervention required by doctors. For future work, the proposed method can be applied over some live ECG signals and Bi-LSTM can be applied instead of LSTM.The results obtained are better as compared to the other existing techniques and will greatly reduce the amount of intervention required by doctors. For future work, the proposed method can be applied over some live ECG signals and Bi-LSTM can be applied instead of LSTM.

Disadvantages:

The model has under-fitting and over-fitting issues, which appear when the model has learnt less than or more than 20 epochs. The over-fitting issue model has a tendency to remember data and is unable to generalise new data, while the under-fitting model has a difficult time testing but is capable of generalising new data.

[2]. Electrocardiogram (ECG) serves as the gold standard for noninvasive diagnosis of several types of heart disorders. In this Study, a novel hybrid approach of deep neural network combined with linear and nonlinear features extracted from ECG And heart rate variability (HRV) is proposed for ECG multi-class classification.

Advantages:

The implementation of Such recent CNNs is very challenging on low-power Embedded devices or wearable devices for long-term Mobile monitoring due to the huge computational Requirements. The hardware design and implementation of The proposed ECG multi-class classification system can be A goal for future investigation.

Disadvantages:

Despite the high performance of the Proposed approach, there are few limitations that can be Investigated in the future. First, the proposed system Requires an automated approach for eliminating all noise And artifact sources from the ECG signals before extracting The ECG features and HRV measures or passing the ECG Signals to the CNN model

]3]. Arrhythmogenic right ventricular cardiomyopathy (ARVC), is an inherited heart muscle disease Characterized by fibro-fatty replacement of the right ventricular myocardium that predisposes patients to Arrhythmia and right ventricular (RV) dysfunction leading in some cases to sudden cardiac death (SCD)

Advantages:

Propose the utilization of a low –Complexity CNN that accomplishes significantly trustworthy classification performance with an Accuracy of 99.98% and 98.6%, a sensitivity of 99.98% and 98.8% and a specificity of 99.96% and 98.25% For the training and testing processes, respectively.

Disadvantages:

Detection and analysis of a heart disease which has Not been widely investigated till now, namely ARVC, based on an everyday medical examination like ECG.

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