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An ECG based classification for automated detection system of ventricular arrhythmias using deep learning approach

T K Revathi and **B Sathiyabhama**
Sona College of technology, India

Heart disease is one of the deadliest diseases in the universe. Generally heart disease occurs due to the disorders in heart beat called arrhythmias which affect the rate and rhythm of the heart. There are several arrhythmias affect normal functioning of the heart. Among all, Ventricular Tachycardia (VT), Ventricular Fibrillation (Vfib), Premature Ventricular Complex (PVC) is the life-threatening arrhythmias that affect young adults. Electrocardiogram (ECG) is the leading diagnostic tool to record the heart rate and rhythm. It is tough for physician to interpret an ECG signal manually. Hence, an Automated Diagnosis System (ADS) is proposed. It uses Convolutional Neural Network (CNN) classifier which automatically diagnoses the irregular ECG signals from huge volume of ECG datasets. CNN designed with eleven hidden layer and four output layers (neurons) represents all the four classes (normal sinus rhythm (Nsr), VT, Vfib, and PVC) of heart conditions. MIT-BIH database samples are used for validating and testing the model. To validate the model, bootstrap aggregation applied on the dataset to train the model with enough trained data samples so that it produces robust classification result. The performance of the model is tested with calculating some statistical measures like accuracy, sensitivity, specificity. The proposed neural network helps the clinicians to diagnose ECG signal with improvised accuracy with robustness in result since the model uses Data Augmentation.

revathikalyan2018@gmail.com