

## Abstract

As per World Health Organization (WHO) cardiovascular diseases (CVD) is one of the most prominent causes of mortality rates all over the world. It is a main cause of death for 17.9 million lives each year. CVDs encompass a variety of cardiac conditions inclusive of rheumatic heart disease, coronary heart diseases, cardiomyopathy, arrhythmia, peripheral arterial disease and others. Many CVDs can be prevented by addressing the risk factors like diabetes, obesity, unhealthy diet, consumption of tobacco, harmful alcohol use.

CVDs can be treated effectively by early diagnosis. The proper diagnosis is possible by detecting the cardiac disease. It can be detected by recording the cardiovascular signal using Electrocardiography (ECG), Echocardiography, Chest X-ray, Heart CT Scan, Doppler Ultrasound etc. They provided valuable information regarding the electrical activity of heart. Cardiovascular signal represents the cardiac activity going on inside our body. For instance, pathologic Q waves, ST elevation, negative T waves etc. indicate acute myocardial infarction, the time interval between two consecutive R peak reveal the automatic regulation of patient which gives information regarding severity of illness. Pulse wave analysis also used for detection of many CVDs such as coronary artery disease, hypertension etc. Non-invasive measurement tool like ECG is very useful for critical care of hemodynamically unstable patients.

Computerized analysis and interpretation of cardiovascular signals has been one of the focused areas of research for electrical and electronics engineering. Analysis of cardiovascular signals has following advantages: non-invasive, cost effective, suitable for real-time monitoring, diagnosis from remote location and the parameters of analyzed signal are useful for clinical use. Due to its potentiality and advantages, the improvement in methodology and application of cardiovascular signal analysis and modeling will be promising in future. Modeling of cardiovascular signals can lead to diseases classification, compression for effective data storage and generation of synthetic waveforms for medical and engineering R&D applications. The proposed research aims to develop new methods for cardiovascular signal modeling and analysis to enable automated detection and interpretation of cardiac abnormalities. Advanced computational intelligence techniques, including deep learning, are employed to extract highly relevant features from cardiovascular signals. These features are then used to build robust and accurate models for cardiac assessment.