CASE STUDY OF THE PROBLEM

Team ID	PNT2022TMID03100
Project Name	Project - Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation

PROBLEM STATEMENT:

According to statistics from the World Health Organization (WHO), 17.9 million people died from cardiovascular disease in 2019. The majority of these deaths occurred as a result of sudden heart attacks and strokes. Usually, an arrhythmia is a problem related to the frequency or rhythm of the heartbeat, and an arrhythmia that causes a lethal heart condition can be caused by a severe arrhythmia. The diagnosis is usually determined by analyzing the patient's electrocardiogram (ECG) along with his/her relevant medical history and clinical manifestations. The ECG signals that indicate abnormality are usually caused by chance, which can't be determined from a short-term monitor. The process is labor-intensive and time-consuming when it relies on only manual analysis of a patient's long-term ECG records. It also lacks real-time performance and cannot deal with sudden risks in patients as a result of centralized analysis after ECGs are recorded.

Computer-aided diagnosis (CAD) for ECG analysis has been made possible with the development of computer science and technology. There have been an increasing number of algorithms proposed for the automatic analysis of ECG signals for the classification of arrhythmias. In general, arrhythmia classification algorithms consist of four steps: pre-processing, heartbeat segmentation, feature extraction, and classification algorithms. The segmentation of heartbeats has been studied for more than 30 years. An adaptive threshold method is used in classical heartbeat segmentation. More and more new technologies are being applied to heartbeat segmentation algorithms, such as wavelet transforms, genetic algorithms, and neural networks. Arrhythmia classification is greatly influenced by the accuracy of heartbeat segmentation. Most studies on arrhythmia classification algorithms use the heartbeat markers in the database, ignoring the influence of errors in heartbeat segmentation.

The deep learning field is a subfield of machine learning. A computational model with multiple processing layers is used to learn data representation with multiple levels of abstraction. Back-propagation is used by deep learning to optimize the parameters of each layer and discover complex structures in large datasets. In many disciplines, such as computer vision, speech recognition, natural language processing, and bioinformatics, it has proven useful. As methods based on deep learning are increasingly used to study arrhythmia classification, the number of studies is increasing.