ABSTRACT

Cardiovascular Diseases (CVD) is the number one leading cause of death globally. Arrhythmia is a CVD disease caused by abnormalities in the rhythm of the heart beat. Arrhythmias are quite serious and can cause death. Diagnosing a person's heart condition with an arrhythmia can be done by identifying the heartbeat using an electrocardiogram (ECG). The process of diagnosing heart conditions can be done manually, by observing a graphic image of a person's heart activity. As technology develops, there are several studies that can identify heart disease automatically using Deep Learning.

In this Final Project, the system is designed to classify five classes of arrhythmias, namely Non ectopic beats (N), Supraventricular ectopic beats (S), Ventricular ectopic beats (V), Fusion beats (F) and Unknown beats (Q) using the Convolution Neural method. Network (CNN) with CNN-1D architecture. The dataset was obtained from the PhysioBank MIT-BIH Arrhythmia database. The dataset used is an unbalanced dataset with a total of 87554 train datasets and 21892 test datasets, so it is necessary to carry out an augmentation process by resampling data. Resampling is done so that the data becomes balanced, the data after resampling becomes 2000 data per class.

In this final project, analyze the system performance based on the effect of augmentation, hidden layer, optimizer, learning rate, Epoch and Batch size. The performance parameters used to evaluate the system are accuracy, precision, recall and F1-Score. The best accuracy is using a balanced dataset with Adam's optimizer, 4 hidden layers, learning rate 0.0001, iteration of 50 epochs and batch size of 64, the results are 92.28%, loss is 0.43, precision is 93%, recall is 92.20% and F1- Score 92.20%. While the accuracy of the system without the augmentation process is 96.68%, precision is 81.80%, recall is 90.60%, F1-Score is 85.60%.

***Keywords**: Adaptive Moment Estimation (ADAM), Arrhythmia, Convolution Neural Network 1D (CNN-1D), Deep Learning, Electrocardiogram (ECG), Heart, Imbalance*