ABSTRACT

Heart disease is the number one leading cause of death in the world. One of the heart diseases that must be considered is arrhythmia. Arrhythmia is a heart disorder characterized by abnormal heart rate and rhythm irregular. Arrhythmias do not only occur in adults, but can also occur in fetuses. Arrhythmia disease is divided into benign arrhythmia and severe arrhythmia. Benign arrhythmias are common in the fetus, whereas severe arrhythmias are relatively rare. Examination of fetal arrhythmias can be performed using ultrasound, magnetocardiography, echocardiography and cardiotocography. There is several studies in the field of signal processing to detect fetal arrhythmias based on deep learning using fetal ECG signals.

This final project aims to design and analyze a fetal arrhythmia detection system using the one-dimensional (1D) Convolutional Neural Network (CNN). The dataset used is non-invasive fetal ECG arrhythmia obtained from PhysioNet with 11 fetal arrhythmia ECG data and 14 normal ECG data. The data is segmented so that it can be used as data training and test data in detecting fetal arrhythmias.

In this final project, an analysis of system performance is carried out based on the effect of batch size values 8, 16, 32, 64 and 128. Then, the effect of the Adam, Nadam, AdaMax, and RMSprop optimizers. The effect of learning rate values of 0.01, 0.001 and 0.0001 and epoch values of 50, 100 and 200 on accuracy results. The best output of this final project is 98% using batch size of 16, learning rate of 0.001, Adam optimizer and epoch of 200. So it can be implemented effectively.

Key Word : Convolutional Neural Network (CNN), Deep Learning, Fetal Arrhythmia, Signal Processing.