ABSTRACT

This study is about compressing tones produced by the piano using compressive sensing (CS). Compressing using CS is a new technique in the field of compression. The information obtained from this research is expected to be useful to add to the repertoire of knowledge about CS's ability in the field of compression textit audio, especially piano instruments. Data that has been compressed in small size, it is expected that this system will help ease the process of storing and sending data. The stages of this compression process begin with the record piano sound using a handphone. The piano sound recorded is the sound of a single tone, namely the tone textit do-re-mi as many as four octaves produced by a standard acoustic piano. Piano tone recording is done with a sampling frequency of 44,100 Hz with eight bits per sample. textit Format storage textit file is textit wav. The signal textit audio piano is then made textit sparse by using textit fast fourier transform (FFT). After passing through the FFT, the compression process with CS is performed on the coefficient of the FFT using a compression matrix with randomly generated elements. The signal reconstruction process is carried out by the reconstruction method textit orthogonal matching pursuit and convex optimization. After the reconstruction process is carried out, the textit inverse fast Fourier transform (IFFT) process is carried out. The output from IFFT is a signal of final reconstruction. At the assessment stage of the CS performance, the similarity between the original signal and the reconstruction signal was measured using the textit root mean square error (RMSE) and textit peak signal to noise ratio (PSNR) methods. RMSE from OMP is $1,2.10^{-3}$ *and RMSE results from CVX are* 75.10^{-4}*. The PSNR results from the two methods namely OMP amounted to 58.1 dB and CVX amounted to 62.4 dB. The results obtained are quite small. if you see the results of the RMSE both methods are close to 0 and the PSNR results that have passed 30 dB, which means it is similar to the initial signal.*

Keywords: Piano Audio Signal, Compressive Sensing, FFT, IFFT, OMP, CVX, Signal Recontruction