ABSTRACT

Audio data in this digital age is very commonly used for both personal and industrial needs. However, the size of the data in the transmission and storage process is an important part because of the problem of data size which often has a large size. Efficient audio data compression solves the data size problem for these storage and transmission needs. Compressed sensing (CS) introduces a signal acquisition technique that goes beyond the efficiency of typical Nyquist theory in sampling. One of the CS methods is sparsity averaging reweighted analysis (SARA) which is proposed to improve the performance of the basis pursuit denoise (BPDN) method. Then, there is a method of source separation via reweighted analysis (SSRA) proposed for one-dimensional signal data. The SSRA method does not average the sparsity basis like the SARA method, so this final project analyzes the modified SARA performance following the SSRA principle on one-dimensional signals.

This thesis analyzes the performance of SARA in the segmented speech signal and music signal consisting of chorus / chorus and verse from jazz and reggae music with wav file types. Where will later be tested on 4 audio files, namely jazz.wav and reggae.wav which represent music data, then ep2.wav and ep3.wav for the speech files. SARA consists of 2 stages, namely the initial stage for determining the basis of sparsity by proposing a new basis from the average results of several bases and the reweighted process of the BPDN reconstruction method. The best audio data results are obtained by a Jazz audio file with a Signal to Noise Ratio (SNR) value of 56.75 dB, the resulting Object Different Grade ODG value of -1.643 and a Structural Similarly Index Measure (SSIM) value of 0.9997. Meanwhile, the best data speech performance obtained was an Ep2 file with an SNR value of 45.10 dB, an ODG value of -3,948 and an SSIM of 0.9981.

Keywords: Compressed sensing, sparsity averaging, reweighted analysis, basis pursuit denoise, spread spectrum, wavelet.