ABSTRACT

Compressed Sensing (CS) (Also known as Compressive sensing, Compressive Sampling, or Sparse Sampling) is a signal processing technique for a smaller sample from what is required by Nyquist sampling theorem and to reconstruct the sampled signal efficiently. One of CS methods is sparsity averaging reweighted analysis (SARA) which is proposed to improve the performance of basis pursuit denoise (BPDN) method. In previous research, SARA was proposed for radio-interferometry image data and natural images. Detailed analysis on SARA in medical images does not exist in literature. To fill this gap, various medical data are used to investigate SARA performance.

This thesis proposed to use SARA analysis on colonoscopy image data. SARA consists of 2 stages, the initial stage to determine the sparsity basis by proposing new basis from the result of several basis and reweighted process from BPDN reconstruction method.

The results of this thesis show that SARA outperforms the BPSA method on the best parameters with an SNR value of 37.85 dB compared to 35.61 dB and an SSIM value of 0.89 compared to 0.72, respectively. The computational time obtained is linear to the number of bases q and the level of decomposition of L, where the computation time is getting longer for the larger values of q and L. The result of SARA computation time is longer than BPSA because of the reweighted process during image reconstruction.

Keywords: *Compressed sensing, sparsity averaging, reweighted analysis, Colonoscopy.*