ABSTRACT

Watermarking is a method used to insert information into an image. In medical images, watermarking is used to insert patient information data to simplify and avoid misdiagnosis of patients. Several watermarking methods that have been studied previously still have problems in the image recovery section which is an important part of medical images. For this reason, this final project is intended to design and analyze the SLT-IWT-SVD method, especially in the condition of returning the original image (reversible).

This final project designs a reversible watermarking system for medical images using the Stantlet Transform Matrix (SLT), Singular Value Decomposition (SVD), and Integer Wavelet Transform (IWT) methods. The medical image watermarking process is divided into two processes, namely the embedding process and the extraction process. In both processes, the host image will be transformed into 8×8 blocks for the SLT process, then proceed with IWT to divide the image into 4 sub-bands. After the process is complete, the resulting image will be decomposed again into 3 new matrices (u, s, v) according to the SVD process and then the value of the s matrix will be exchanged with the processed s matrix value (embedding or extraction). The 3 matrices will be inverted again to produce a watermarked image or an extracted image.

The combination of SLT-IWT with SVD can improve the quality of the watermarked image by taking into account the parameters of robustness, imperceptibility, embedding capacity, and reversibility. The embedding process has a PSNR with an average of 81.08410175 dB and an average SSIM of 0.9252545. The extraction process produces an average BER of 0 and an average NC of 1. The results of this final project can be used as a reference for the development of a watermarking method using the SLT-IWT-SVD method.

Keywords: Watemarking, medical images, SLT (Stantlet Transform Matrix), IWT (Integer Wavelet Transform), SVD (Singular Value Decomposition)