ABSTRACT

Medical image is an image that contains important and sensitive information about the state of the patient's health that can not be known by people who are not interested. Therefore, a medical image must be protected and resilient. In realizing this, a watermarking process is carried out on the medical image. Watermarking is done aims to maintain the security of patient data.

In this Final Project a watermarking method based on Discrete Wavelet Transform (DWT), Fast Discrete Time Curvelet Transform (FDCuT), and Discrete Cosine Transform (DCT) is designed on medical images. In watermarking this medical image is processed into two parts namely the embedding process and the extraction process. In the embedding process produces an output that is a watermarked medical image and its quality is seen by calculating the SNR, PSNR and SSIM of these results. Then the extraction process produces an output that is the extracted watermark image and viewed its quality by calculating the BER and NC of the results.

The results of this study are the medical image watermarking system with the proposed method that is DWT-FDCuT-DCT which obtains an average SNR value of 39.3987 dB, PSNR 49.4819 dB, SSIM 0.9938, BER 0.0028 and NC 0, 9873 and has robustness to salt and pepper noise attacks with densities less than 0.01, robust to gaussian filter attacks with sigma less than 0.5, robust to JPEG compression attacks with quality above 75, robust to noise speckle attacks with variance less than 0.04 and robust to rotational attacks with a turning angle of 90, robust to image sharpening attacks with standard deviations 1 and 5, robust to flipping and histogram equalization attacks, but not robust to median filter attacks, mean filters, image blurring, cropping, and gaussian noise. This method also has better results than the method in previous studies using the DWT-DCT and FDCuT-DCT methods.

Keywords : *Medical Image, Watermarking, DWT, FDCuT, DCT.*