ABSTRACT

The development of communication technology, multimedia, copyright protection, authentication of medical data content in the form of medical images has received increasing attention in recent years. This results in unauthorized parties manipulating, duplicating, and claiming ownership of the data. Therefore, we need a technique that can provide copyright protection and claim ownership of the medical images, namely watermarking. Watermarking is a technique used to insert certain data / information into a host in the form of images, videos, and audio.

This Final Project applies Singular Value Decomposition (SVD) based on Speeded-Up Robust Features (SURF), dan Discrete Cosine Transform (DCT). Arnold's Cat Maps is applied to the original watermark image by randomizing it by changing the pixel coordinates so that the layout of the image changes. At the embedding stage, the scrambled watermark image will be inserted into the host image by applying SURF, DCT, and SVD, so that it will produce a watermarked image. At the extraction stage, the extracted image will be reconstructed using Arnold's Cat Map, it will produce an extracted watermark image.

The results showed that the PSNR value was above 39.48 dB, the SSIM value was above 0.93, the BER and the resulting NC were 0 and 1 for all modalities. The capacity for each modality is 0.5 bpp which indicates the number of watermarks embedded in the medical image. Therefore, the proposed scheme has good imperceptibility and is also able to restore the extracted image the same as the original watermark image in a non-attacked condition. In addition, it has good resistance to JPEG compression attacks, speckle noise, salt & pepper, 4% and 8% gaussian noise, flipping, 90° rotation, sharpening, and histogram equalization.

Keywords: *Watermarking*, *medical images*, *Speeded-Up Robust Features*, *Discrete Cosine Transform*, *Singular Value Decomposition, chaotic, Arnold's cat map*