ABSTRACT

The technique used to protect multimedia copyright is watermarking, which is the process of adding additional information to images, video or audio to maintain information security. Medical images can be categorized as intellectual property rights, therefore it is necessary to protect copyright by using watermarks, which are known as copyright watermarks. The robust watermarking method can be applied for copyright purposes because it has strong properties against various attacks. This means that the watermark can still be recognized and extracted even if the watermarked image is attacked.

The watermarking process can be carried out in the spatial domain or transformation domain such as DCT, DFT, DWT, and SVD. The main goal of the watermarking process is to insert a watermark on the host image without reducing the visual quality of the original image. DWT is a method that can work in the low frequency range, which is less sensitive to changes. However, DWT-based watermarking methods find it difficult to maintain resistance to geometric attacks. Therefore, matrix decompositions such as SVD and HD are used.

Robust watermarking schemes must have good imperceptibility and robustness, but there is often a trade-off between the two. Previous research has proposed a watermarking method that combines DWT with SVD and HD in the high-high (HH) sub-band. This method has strong imperceptibility and resistance to various attacks, but is less resistant to noise attacks. Therefore, in this research, an image watermarking method is proposed in the DWT transformation domain and HD and SVD matrix decomposition in the LL sub-band with Particle Swarm Optimization. The results of the watermarking scheme analysis for medical images show good imperceptibility quality with the highest PSNR value of 49,8469 dB and SSIM higher than 0.98. Evaluation using NC parameters shows the scheme's resistance to noise attacks, compression, filters and several geometric attacks such as rotation and rescale.

Keywords : *Watermarking, Robust Watermarking, DWT, SVD, HD, PSO.*