

## **ABSTRACT**

*Audio watermarking is the process to insert an information, sign, or messages in digital content. The tour is called watermark. The embedded watermark can be image, sound, text, etc. The purpose of the watermark itself is to signify ownership or copyright of the content from being stolen by persons who are not responsible.*

*Watermarking process can be done by many methods. At this time, a Discrete Cosine Transform (DCT)-based audio content, will be inserted a watermark with the method of Singular Value Decomposition (SVD), and then optimized by Genetic Algorithm. There is help from Cartesian Polar Transformation (CPT) in it.*

*At first, the audio file must go through the framing process. The purpose of framing is to divide the voice signal into multiple frames. Then, each frame is stated in the frequency domain using DCT. Next, decompose of each frame into  $U$ ,  $S$ , and  $V^T$  matrixes (SVD). Change the eigen of the matrix  $S$  to the polar coordinate system, then insert the watermark with QIM. Finally, optimize the parameters of each attack with the genetic algorithm to obtain optimal parameters.*

*The most optimal parameters obtained are frame length of 8192 pixels, 4 bits of quantitation number, and 16 bit depth from pitch shifting attack. Audio with the most optimal parameters robust to resampling, mp3 compression, noise, time scale modification, and speed change attacks because it has BER below 10%, while audio is susceptible to LPF attack, BPF, pitch shifting, and equalizer for having BER over 10 %. This attack was chosen based on previous research.*

*Keywords: Watermarking, Discrete Cosine Transform (DCT), Singular Value Decomposition (SVD), Cartesian Polar Transformation (CPT), robustness, Genetic Algorithm.*