

ABSTRACT

Watermarking is a technique of inserting digital data into a multimedia file such as voice, *image* or video, where its presence is not felt by human senses. In general, only one watermark is inserted in a multimedia data as a sign of copyright or as authentication data. However, in certain circumstances, both a copyright watermark and an authentication watermark must be inserted in a multimedia file. For that purpose, a multipurpose watermarking algorithm that can perform both functions is required.

In this final project, a multipurpose audio watermarking based on Vector Quantization (VQ) in Discrete Cosine Transform domain (DCT) using a codeword labeling is implemented. The use of this watermarking can meet the need for copyright protection and authentication of data at the same time to an audio file. In the process, two watermarks data those are robust watermark as copyright label and fragile watermark as data authentication are inserted. Robust watermark is inserted in the middle frequency coefficients of the DCT transformation and the fragile watermark is inserted in the high frequency coefficients of the DCT transformation. Both robust and fragile watermarks can later be extracted without using the original audio signal.

In this final project, some variety of analysis are applied, including analysis of imperceptibility of the watermark, the watermark data extraction analysis, and analysis of the results of watermarking output file both objectively and subjectively. The results obtained from the objective assessment are the watermarked audio obtained SNR (Signal to Noise Ratio) values ranging from 26,8 to 31,8 dB, the robust watermark obtained NC (Normalized Correlation) values ranging from 0.91 to 0.99, while for the fragile watermark NC value ranging from 0.99 to 1. From the subjective assessment, MOS (Mean Opinion Score) values for watermarked audio is 3,5 to 4,4, the robust watermark is 3.3 to 5, while for the fragile watermark MOS value obtained was 5.

Keywords: multipurpose audio watermarking, vector quantization, discrete cosine transform, copyright protection, data authentication.