

Abstract

Audio watermarking is a method of hiding data into an audio file, but its presence isn't known by the human senses. The audio watermarking method must be able to deal with the processes of digital signal processing (resampling, compression, low pass filtering, etc.) until at a certain stage.

*In this final report, it's implemented an audio watermarking method based on combination of Direct Sequence Spread Spectrum and Modified Discrete Cosine Transform methods with Complementary Filter Bank for the filtering process. The audio which is used as the host file is *.wav format and the watermark is a binary image file or text file. The results from this system further tested to determine objectively the quality of the watermarked audio and the extracted watermark. Furthermore, to know the robustness of the watermark from digital processing, then the watermarked audio is tested by MP3 compression, resampling, and low pass filtering.*

From the robustness testing, it's obtained that the result of this system is influenced by embedding scale, filter levels, and the size of the watermark. The watermarked audio quality earned very good at embedding scale 4 with average SNR value of 74.9 dB. To balance the aspects of imperceptibility and robustness, the optimal combination for this system is filter level = 6 and embedding scale = 3. Based on the test of robustness, the system is robust enough to MP3 compression with bitrate 128 kbps, Low Pass Filtering with cut-off 3 kHz and resampling 22.05 kHz and 11.025 kHz.

Keywords: *Audio Digital watermarking, Direct Sequence Spread Spectrum, Modified Discrete Cosine Transform, Complementary Filter Bank*