ABSTRACT

Digital piracy in audio data is a serious problem because it threatens the copyright of the original content. Spread spectrum (SS) based audio watermarking is an effective solution to prevent the act of digital audio piracy. The spread spectrum (SS) audio watermarking methods have been reported by much literature, but many of them could not have enough capacity and high robustness, concurrently.

The audio watermarking system in this thesis is based on a novel Adaptive Segmentation and Multibit SS-based audio watermarking that can embed large watermark bits into a host audio signal using one pseudo-noise (PN) to represent multiple watermark bits. The audio watermarking method in this thesis is also robust against desynchronization attacks by calculating the maximum response value of the second-order derivative of the original audio signal without compromising the robustness and the imperceptibility.

Through multiple simulation experiments, the audio watermarking system in this thesis has proven to be effective. The experimental data shows that the Objective Difference Grade (ODG) is -0.7, the Signal-to-Noise Ratio (SNR) is 44.63 dB, the capacity is 172 bps, the average Bit Error Rate (BER) is 0% under common attacks and it is averaging in 23% under desynchronization attacks. The experimental results indicate that the audio watermarking system in this thesis has good imperceptibility, has large embedding capacity and strong robustness.

Keywords: Audio watermarking; digital audio piracy; adaptive segmentation; multibit spread spectrum.