ABSTRACT

In this thesis, the problem of digital watermarking in audios for protection of copyright and deterring/preventing piracy is addressed. Transform domain audio watermarking schemes based on Discrete Cosine Transform (DCT), Singular Value Decomposition (SVD) are developed with improved imperceptibility, robustness, security and payload. SVD based watermarking scheme inherently robust to mp3 compression attack using mp3 attack characterization is also proposed and developed.

The drawbacks of current watermarking schemes that are traditionally based on DCT and SVD are analyzed. The first focus is on developing improved DCT based audio watermarking schemes which use the mid band DCT coefficients for watermark embedding. The mid band DCT coefficients are selected based on their robustness to filtering and mp3 compression attack characterization and experiments conducted for the same.

The second focus is on development of high payload schemes for which SVD is used. The proposed SVD based audio watermarking schemes use Baker’s map for permuting the watermark as well as the SVD matrix before embedding of the watermark. The SVD based schemes lack security as the singular values (SVs) that are modified for watermark embedding are exposed. The Baker’s map produces chaotically permuted matrix, so the SVs becomes irretrievable without the encryption keys. The watermark is embedded on the permuted SVD matrix obtained from the segmented original audio.

The third focus is on developing audio watermarking scheme inherently robust to mp3 compression at different compression rate. The proposed scheme uses a block based approach in which group of SVs are used for embedding one watermark bit. Block selection is based on the robustness of the block when undergone mp3 compression attack at different compression rate.

Extensive experiments are carried out to evaluate and compare the proposed schemes with the state of the art schemes.

Finally, we proposed and developed a method to generate unique watermarks for watermarking a multimedia content. The watermark is generated from the MFCC of the individual frames of the speech of an individual.