

Abstract

The increased use of Internet and effortless copying, tampering and distribution of digital data, copyright protection for multimedia data has become an important issue. Digital watermarking emerged as a cost effective tool for protecting the multimedia data from copyright infringement and for data authentication. This thesis concentrated on developing watermarking techniques for copyright protection and authentication of digital images in wavelet domain. A review classifying the watermarking methods and discussing the landmark papers in the area of watermarking is presented. Four novel contribution, three for robust watermarking and one for authentication watermarking were developed.

The first algorithm is developed to address the problem of embedding grayscale logos in digital images. For embedding the logo robustly and imperceptibly, a method exploiting the human visual system (HVS) characteristics is presented. A method for reliable extraction of the watermark from possibly distorted image using the original image is also developed. With the experiment the results of the proposed method are verified for different type of attacks and were compared with the results of the existing methods.

An approach for robust watermarking in which the original image is not required during the watermark extraction is developed. The algorithm uses the quantization based approach for watermarking which is free from host interference. This approach mainly concentrated on incorporating HVS characteristics during the quantization of the coefficients for watermarking. Experimental results demonstrate the robustness of the algorithm for different types of attacks and the superiority was shown by comparing with existing methods.

In fixed quantization based watermarking methods, a single quantization bin is

used for embedding the watermark without considering the contents of the image. To address this problem, an algorithm was developed for selecting the quantization bin value based on the contents of the image using HVS characteristics. Through the experimental results the advantage of adaptive quantization based watermarking over fixed quantization watermarking are presented.

To tackle the problem of content integrity and tamper detection an authentication watermarking method was developed. The algorithm was developed by taking the best features of digital signature and watermarking based authentication methods. A novel approach for detecting the tampered regions by ignoring the incidental distortions was presented. The validity of the proposed method was showed by testing it with different types of incidental and malicious distortions.