

REVERSIBLE WATERMARKING BASED ON INTELLIGENT COEFFICIENT SELECTION AND INTEGER WAVELET TRANSFORM

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ABSTRACT. *This work presents a lossless data hiding method using integer wavelet transform and Genetic Programming (GP) based intelligent coefficient selection scheme. By exploiting information about the amplitude of the wavelet coefficient and the type of the sub band, GP is used to evolve a mathematical function in view of the payload size and imperceptibility of the marked image. The evolved mathematical function acts like a compact but robust coefficient map for the reversible watermarking approach. Information is embedded into the least significant bit-plane of those high frequency wavelet coefficients that are intelligently selected by the Genetic Programming module. The proposed approach does not only extract the hidden information, but also recovers the original image content. Experimental results demonstrate the effectiveness of this scheme in terms of payload and imperceptibility.*

Keywords: Reversible watermarking, Genetic programming, Integer wavelet transform, Payload, Imperceptibility, Coefficient selection

1. Introduction. With the prevalence of interconnected networks and the ease of creation, storage, and transmission of multimedia content, digital watermarking is playing an ever important role. Digital media is always susceptible to content piracy and illegitimate manipulation. Two techniques, namely steganography and watermarking that belong to the information-hiding technology, deal with these problems [1]. This work presents a reversible watermarking technique. Traditional watermarking techniques cause irreversible degradation of an image. Although the degradation is perceptually sparse, it may not be admissible in applications like medical, legal or military imagery. For applications such as these, it is desirable to recover the embedded information as well as the sensitive host image. For example, in a database of medical images marked with patient information, it is desired to extract the patient information along with recovery of the original host signal for proper diagnosis. Unlike robust watermarking [2,3], in reversible watermarking the original image is completely restored from the watermarked image, thus, preserving the originality of the cover work.

An efficient reversible watermarking scheme should be able to embed more information with less perceptual distortion, and equally, be able to restore the original cover work content. Watermark capacity and imperceptibility are two contradicting properties. If one