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MULTIPLE WATERMARKING BASED ON VISUAL SECRET SHARING

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Abstract. *With the proliferation of digital multimedia, more and more schemes for digitally watermarking have been proposed to provide alternative/complementary solutions for digital multimedia security, including copyright protection, multimedia authentication, broadcast monitoring, traitor tracing, etc.. These watermarking tasks are not mutually exclusive. Moreover, any multimedia document may have been subjected to multiple watermarking applications or several repetitions of a single goal. For the developments of digital watermarking techniques, robustness enhancement, public verification and multiple-watermarking applications are three major focuses. In this paper, a watermarking model for multiple-watermarking applications, based on visual secret sharing, is proposed. The feature of the proposed model is to involve the concept of visual secret sharing into multiple watermarking. Furthermore, an implementation instance, aiming at enhancing the robustness of watermarks, is shown for which a series of experiments over both DWT- and DFT-domain were conducted. The proposed scheme has the following advantages: First of all, the proposed scheme is resistant to both common image processing and geometric distortion without losing commercial value of the protected contents. Second, the protection of both the owner's copyright and the customer's ownership is considered. Finally, visual secret sharing is introduced to make user-right-proving publicly verifiable.*

Keywords: Multiple watermarking, Visual secret sharing, Publicly verifiable, Digital wavelet transform, Discrete Fourier transform

1. **Introduction.** As the progress in networking technology has enabled much faster and easier distribution of digital documents, duplicating and distributing digital documents have become as simple as clicking a button. Accordingly, the issue of copyright protection has become more imperative than ever. Furthermore, the current problems with copyright protection obstruct the rapid evolution of computer and communication networks [1]. Hence, the enhancement and further development of digital copyright protection are central to the development of future communication networks.

Soon after, the significance of copyright protection for digital documents was highlighted, digital watermarking techniques have been widely considered as one candidate