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Dual Water Marking Embedding using Frequency Domain Technique

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ABSTRACT: Multimedia watermarking technology has evolved very quickly during the last few years. A digital watermark is information that is imperceptibly and robustly embedded in the host data such that it cannot be removed. A watermark typically contains information about the origin, status, or recipient of the host data. In this tutorial paper, the requirements and applications for watermarking are reviewed. Applications include copyright protection, data monitoring, and data tracking. The basic concepts of watermarking systems are outlined and illustrated with proposed watermarking methods for images, video, audio, text documents, and other media. Robustness and security aspects are discussed in detail. Finally, a few remarks are made about the state of the art and possible future developments in watermarking technology.

I. INTRODUCTION

At the beginning of 1990 the idea of digital watermarking, embedding imperceptible information into audiovisual data, has emerged. Since then worldwide research activities have been increasing dramatically and the industrial interest in digital watermarking methods keeps growing. The first academic conference on the subject was organised in 1996.2 Digital watermarks have mainly three application fields: data monitoring, copyright protection, and data authentication. The first watermarking methods were proposed for digital images by Caronni8,9 in 1993, although earlier publications already introduced the idea of tagging images to secretly hide information and ensure ownership rights.42,41 Since then, the idea of digital watermarking has been extended

to other data such as audio and video. For recent overviews of digital watermarking methods the reader is referred to Anderson,2 Aucsmith,3 and Swanson et al.39 Besides designing digital watermarking methods, an important and often neglected issue addresses proper evaluation and benchmarking. This not only requires evaluation of the robustness, but also includes subjective or quantitative evaluation of the distortion introduced through the watermarking process. Only few authors (e.g., Braudaway7 or Kutter et al.22) report quantitative results on the image degradation due to the watermarking process. In general, there is a tradeoff between watermark robustness and watermark visibility. Hence, for fair benchmarking and performance evaluation one has to ensure that the methods under investigation are tested under comparable conditions. In this paper we propose a way to evaluate and compare performances of “robust” invisible watermarking systems. In Section 2 we redefine the generic watermarking scheme and identify important parameters and variables. Distortion metrics and attacks on watermarks are described in Section 3 and Section 4, respectively. In Section 5 we propose different graphs useful for performance assessment. Our benchmark procedure and an image database are introduced in Section 6.

DIGITAL WATERMARKING: FRAMEWORK, DEFINITIONS AND PARAMETERS In order to identify important watermarking parameters and variables, we first need to have a look at the generic watermarking embedding and recovery schemes. In the following we use the same notation for sets and their elements; the difference should be obvious to the reader. Figure 1 illustrates the generic embedding process. Given an image I, a watermark W and a key K (usually the seed of a random number generator) the embedding process can be defined as a mapping of the form: $I \times K \times W \rightarrow \tilde{I}$ and is common to all watermarking methods. The generic detection process is depicted in Figure 2. Its output

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is either the recovered watermark W or some kind of confidence measure indicating how likely it is for a given watermark at the input to be present in the image ˜I0 under inspection. There are several types of watermarking systems. They are defined by their inputs and outputs:

II. PROPOSED WORK

In this paper a hybrid watermarking scheme using SVD and DWT has been introduced, where the watermark is embedded in the singular values of the Y component of the cover image's DWT sub bands and then combined with the other two i.e. U and V components to yield the watermarked image. The methods adopted fully exploit the features of the SVD and DWT transform. The intrinsic algebraic properties of the image represented by SVD and the spatial-frequency localization of DWT are well utilized. Experimental results are made available which depict the improved imperceptibility and robustness under attacks and preserve copyrights by using this technique. In this present approach for robustness we can apply various attacks on the images and check the correspondent PSNR values. Further work of integrating human visual system (HVS) characteristics into our approach is in progress for robustness and more secure application.

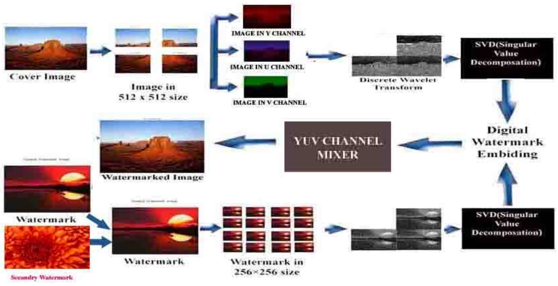

Figure.1. Procedure of embedding Dual watermark in an Image

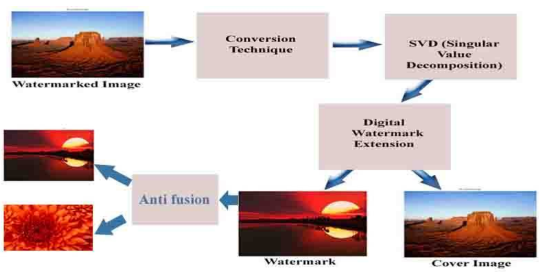

Figure.2. Procedure of extracting watermark from an Image

III. RESULTS

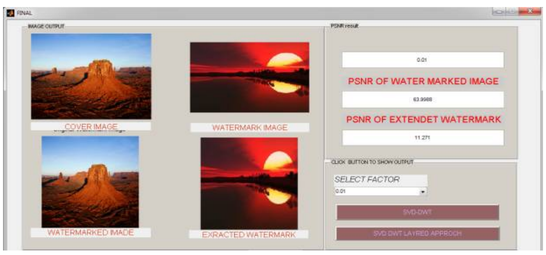

Figure 3 :PSNR of the Watermarked and the Extracted Watermark Image using Layered SVD and DWT Technique for Scale Factor - 0.01

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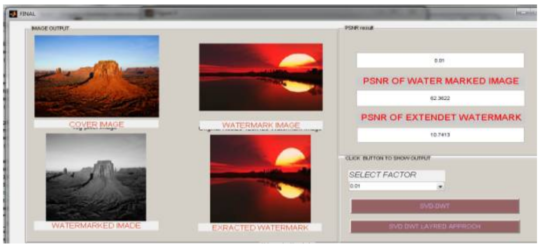

Figure 4:PSNR of the Watermarked and the Extracted Watermark Image using SVD and DWT Technique for Scale Factor - 0.01

TABLE:1 shows the comparison results of PSNR values of proposed method with SIMPLE DWT and SVD based colour image watermarking methods.

WATERMARKING SCHAEME	PSNR WITH α =0.01	PSNR WITH α =0.05	PSNR WITH α =0.09
DWT-SVD	61.3621	47.6281	42.5079
PROPOSED APPROCH	62.9988	49.4752	44.5949

Values of PSNR are desired for good image watermarking. From TABLE , it can be said that in case of PSNR values the proposed method outperforms the existing methods

Comparison Plot of Varying PSNR with Scale Factor of Watermarked Image for SVD - DWT and Layered SVD - DWT Technique

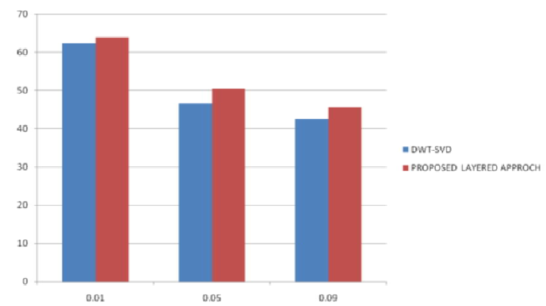

Figure 5 : Plot of Varying PSNR with Scale Factor of Watermarked Image for SVD -DWT and LayeredSVD - DWT Technique

IV. CONCLUSION

TABLE shows the comparison results of PSNR values of proposed method with SIMPLE DWT and SVD based colour image watermarking methods. Values of PSNR are desired for good image watermarking. From TABLE, it can be said that in case of PSNR values the proposed method outperforms the existing methods.

In preset work a hybrid watermarking scheme using Layered SVD and DWT has been introduced, where the watermark is embedded in the singular values of the red component of the DWT sub bands and then combined with the other two i.e. green and blue components to yield the watermarked image. The methods adopted fully exploit the features of the SVD and DWT transform. The intrinsic algebraic properties of the image represented by SVD and the spatial-frequency localization of DWT are well utilized. Experimental results are made available which depict the

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improved imperceptibility and robustness under attacks and preserve copyrights by using this technique. In this present approach for robustness we can apply various attacks on the images and check the correspondent PSNR values. Further work of integrating human visual system (HVS) characteristics into our approach is in progress for robustness and more secure application.

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