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ROBUST BLIND DWT BASED DIGITAL IMAGE WATERMARKING USING SINGULAR VALUE DECOMPOSITION

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Abstract. *This paper presents a robust and blind digital image watermarking scheme for copyright protection based on discrete wavelet transform and singular value decomposition (SVD). The basic idea of the proposed method is to embed the singular values (SVs) of the watermark image into the specific values of the SVs of the transformed host image. At the first step, the host image is transformed to wavelet domain and then SVD transform is applied to each sub-band. In the next stage, the SVs of each sub-band and the SVs of the watermark image are converted to new semi-binary arrays form. Finally, using the semi-binary arrays, the values of SVs of the watermark image are inserted into the selected values of SVs of the decomposed host image's sub-bands. The experimental results show clearly high transparency of the watermarked images as well as strong robustness of the proposed watermarking scheme against different geometric and non geometric attacks.*

Keywords: Blind watermarking, Robust watermarking, Discrete wavelet transform, Singular value decomposition

1. **Introduction.** With the rapid development of computers, digital equipments and internet, the multimedia data can easily be distributed, copied and used legally or illegally. Therefore, copyright protection of multimedia data becomes more essential. One of the best methods to protect copyright and proof of ownership is digital watermarking.

Digital watermarking is a process of modifying the host data with embedding an invisible mark data such as logos, images, texts and audio. The watermarking method is referred to as blind, if the original or reference images are not required during the extraction process, otherwise it is referred to as non-blind [2-4]. There are some important features required for a digital image watermarking system used for copyright protection applications. First, the watermark embedding process should not noticeably degrade the quality of the original image. In other words, the watermarked image should provide a high degree of transparency. Second, the watermarked image should resist against different geometric and non geometric attacks. This feature is known as robustness. Finally, the blindness is necessary especially where obtaining the original image in watermark extracting process is difficult. There is a tradeoff between transparency and robustness; therefore, it is an important issue to solve this problem and introduce an algorithm which provides strong robustness and at the same time offers good transparency.