Abstract

Nowadays, there is an explosive growth in the digital multimedia creation, capturing, processing and distribution. Protecting the multimedia contents from copyright infringement has become a major concern. Encryption and watermarking are two complementary techniques that are used for protecting the multimedia data. In this paper, a proposed hybrid encryption-watermarking algorithm for copyright protection is proposed. The watermarking phase of this proposed algorithm is based on combining the discrete wavelet transform (DWT), the discrete cosine transform (DCT), and the singular value decomposition (SVD), while the encryption phase is based on using four chaotic maps with different dimensions. The proposed watermarking scheme uses a new PN-codes embedding strategy of the watermark into the cover image. This strategy allows decreasing the embedding strength factor of the scheme to a value that maximizes imperceptibility performance while maintaining acceptable robustness of the watermarking scheme. The performance of the proposed watermarking scheme is evaluated individually based on the robustness and the imperceptibility measures. This scheme is
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compared with some recent existing algorithms and experimental results show the improvements of the proposed algorithm over these algorithms. On the other hand, the proposed chaos-based encryption algorithm used four chaotic maps of different dimensions and it has two diffusion stages rather than one to improve the algorithm efficiency. The proposed encryption algorithm is tested using different experiments. The experimental results demonstrate that the proposed encryption algorithm shows advantages of large key space, high resistance against differential attacks and high security analysis such as statistical analysis, and sensitivity analysis. Compared to some traditional and recent encryption algorithms, the proposed encryption algorithm is much more secure. Finally experimental tests demonstrate that the proposed hybrid encryption-watermarking algorithm introduces high degree of efficiency, robustness, and security.

References

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**Index Terms**

Computer Science  
Security

**Keywords**

Chaotic maps, Encryption, Digital Watermarking, Discrete Wavelet Transform (DWT), Discrete Cosine Transform (DCT), Singular Value Decomposition (SVD).