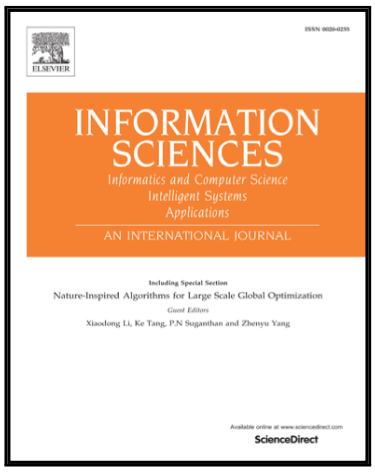

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Reversible data hiding based on an adaptive pixel-embedding strategy and two-layer embedding

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Abstract

Recently, Peng *et al.* proposed a reversible data-hiding (RDH) method based on pixel value ordering (PVO) and prediction-error expansion. In their method, the maximum and minimum of a pixel block are predicted and modified to embed data, and reversibility is guaranteed by keeping the PVO of each block invariant after embedding. In this paper, a novel RDH method is proposed by incorporating an adaptive pixel-modification strategy into Peng *et al.*'s work. In our method, the smoother a block, the more data it can carry. Unlike Peng *et al.*'s method, which embeds data uniformly, ours can embed data (e.g., 2, 4, or 6 bits) adaptively into a block according to the local complexity. Specifically, the local complexity is classified into four levels according to the strength of the correlation between each block and its neighborhood. Then the number of pixels to be modified is determined by the complexity level such that more bits are embedded into a block located in a smoother region. Moreover, two embedding layers are utilized together to further decrease the embedding distortion. Extensive experiments verify that the proposed method outperforms Peng *et al.*'s, Ou *et al.*'s, Li *et al.*'s, Sachnev *et al.*'s, and Hong *et al.*'s works.

Keywords: Reversible data hiding, adaptive pixel modification strategy, two-layer embedding,

1. Introduction

In some applications, such as law enforcement, medical and military image systems, any permanent distortion to host images by data-hiding techniques is unacceptable. In such cases, the original image is required to be recovered without any distortion after extraction of the embedded data. The data-hiding techniques satisfying these requirements are referred to as reversible (or lossless) data hiding.

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