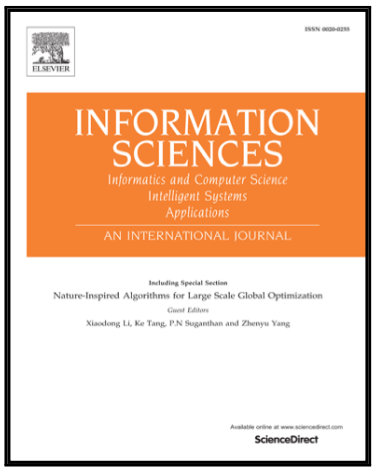

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Wenguang He, Gangqiang Xiong, Shaowei Weng, Zhanchuan Cai, Yaomin Wang

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Reversible data hiding using multi-pass pixel-value-ordering and pairwise prediction-error expansion

Wenguang He[a], Gangqiang Xiong[a], Shaowei Weng[b], Zhanchuan Cai[c], Yaomin Wang[c,*]

[a] *School of Information Engineering, Guangdong Medical University, Guangdong 524023, China*

[b] *School of Information Engineering, Guangdong University of Technology, Guangdong 510006, China*

[c] *Faculty of Information Technology, Macau University of Science and Technology, Macau*

Abstract

Pixel value ordering (PVO) prediction can achieve remarkable accuracy and thus provide a rather sharp histogram. In addition, the efficiency in histogram manipulation also attracts much attention in recent works. In this paper, a new reversible data hiding scheme based on multi-pass PVO and pairwise PEE is proposed. After dividing the host image into non-overlapped blocks, the largest/smallest two pixels within block are predicted to form a prediction-error pair and finally a 2D prediction-error histogram. Here, the third largest/smallest pixel no longer always serves as predicted value. Once any one error in a pair is shifted, we propose to adaptively re-calculate the other one. For smooth block, location information is considered and then more expandable errors are obtained. For normal block, the shifted pixel is involved in prediction and shifting two errors in a pair without carrying any bit can be avoided. Such multi-pass prediction leads to the so-called high and low power version of PVO-based pairwise PEE. Experimental results verify that their combination can achieve very efficient capacity-distortion trade-off and thus outperform previous PVO-based schemes.

Keywords: Reversible data hiding, multi-pass pixel value ordering,

*Corresponding author

Email address: 249668530@qq.com (Yaomin Wang)