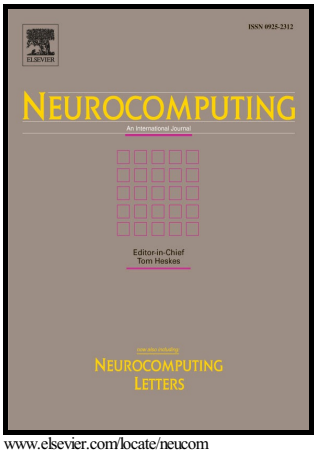

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High-fidelity reversible data hiding based on geodesic path and pairwise prediction-error expansion

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Abstract

It is often important for reversible data hiding (RDH) to reduce the amount of image modifications for a given capacity. To this end, recently, a pairwise prediction-error expansion (pairwise PEE) is proposed to better exploit the image redundancy in the two-dimensional (2D) space. However, in conventional pairwise PEE, a drawback is that the pixel pair is generated by a fixed combination manner, which may limit the further improvement of embedding performance. Based on this consideration, we propose a new histogram generation strategy for the 2D RDH by using geodesic path. In contrast to the fixed manner, the pixels are adaptively combined into pairs with respect to the local similarity in terms of both spatial distance and intensity. As a result, the prediction-errors in a pair are more correlated to each other and the derived 2D PEH is more advisable for pairwise PEE. Experimental results show that, the proposed method can reduce the embedding distortion of conventional pairwise PEE, and yields a superior performance than some state-of-the-art methods.

Keywords: Reversible data hiding, pairwise prediction-error expansion, histogram generation, geodesic path.

1. Introduction

In the information era, the advancement of multimedia technology has greatly facilitated the digital media applications on video, image, and audio. Such an advantage also poses a challenging task of protecting the intellectual property of digital content. To verify the content integrity and prevent forgery, the common ways are encryption, fingerprinting, data hiding and so on. However, these techniques may alter the image content permanently, which can cause serious problems in sensitive fields, such as military, judical and medical imagery. This limitation promotes the need for another way of intellectual protection that can

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