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Abstract

In this paper a steganographic method is proposed to improve the capacity of the hidden secret data and to provide an imperceptible stego-image quality. The proposed steganography algorithm is based on the wavelet packet decomposition (WPD) and neutrosophic set. First, an original image is decomposed into wavelet packet coefficients. Second, the generalized parent-child relationships of spatial orientation trees for wavelet packet decomposition are established among the wavelet packet subbands. An edge detector based on the neutrosophic set named (NSED) is then introduced and applied on a number of subbands. This leads to classify each wavelet packet tree into edge/non-edge tree to embed more secret bits into the coefficients in the edge tree than those in the non-edge tree. The embedding is done based on the least significant bit substitution scheme. Experimental results demonstrate that the proposed method achieves higher embedding capacity with better imperceptibility compared to the published steganographic methods.

Key Words— Image Steganography, Wavelet Packet Transformation, Neutrosophic Set, Edge Detection.

1. Introduction

Due to the development of computer networks, internet and digital media, the information security has become increasingly important. Several techniques such as cryptography, steganography, coding, are widely used in the field of information security to manipulate information messages such as data hiding. The information security systems provide two main disciplines: information encryption and information hiding [19, 20]. Information encryption, or cryptography, is a process of scrambling the data such that it cannot be understood. On the other hand, information hiding, as the name implies is to make sure the added information is invisible. It can be further classified into watermarking and steganography [19, 20]. Watermarking is used to protect the copyright and it guarantees the integrity of the transmitted data.

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