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AN AGENT-BASED LSB SUBSTITUTION IMAGE HIDING METHOD

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Abstract. *This paper proposes an agent-based LSB substitution image hiding method. This method first transforms a cover image from the spatial domain into the frequency domain and splits the secret data into secret patterns. It then hides the agent pattern* ***AP*** *of each secret pattern* ***SP*** *in the least significant bits (LSB) of a coefficient in the high frequency band of the frequency domain cover image. This paper also provides a genetic algorithm to decide the most suitable agent pattern for each secret pattern, so that* ***AP*** *is more similar to the LSB of the coefficient than* ***SP****. Modifying the agent-based LSB substitution hiding method by using an optimal pixel adjustment process, this paper also provides an optimal agent-based LSB substitution hiding method so as to further the quality of stego image. The experimental results show that the proposed methods do not only provide satisfying stego image quality but also have high robustness in resisting damage to the stego image.*
Keywords: Image hiding, LSB substitution, Discrete wavelet transform

1. **Introduction.** With the rapid development of Internet and multimedia technologies, one can easily conceal a large amount of secret information in various kinds of digital media and send the secret information to the receiver by transmitting the digital media via Internet. Image hiding embeds secret data in an image which is usually called a cover image and the hiding procedure is named embedding. After hiding the secret data, the cover image becomes a stego-image [1-9,12,16-19,22]. The purpose of image hiding is to make the embedded data invisible to unauthorized people.

A successful image hiding method should fulfill the following basic requirements [11]:

(1) Imperceptibility: The human eye should be unable to differentiate between the stego-image and the cover image.
(2) Statistically undetectable: One should be unable to conjecture any information about the secret image from the stego-image using statistical, mathematical or physical methods.
(3) Security: Upon embedding the secret image, only the person with a baseline amount of relevant information can extract this embedded secret image.
(4) Capacity: The amount of information embedded in the cover image can be large.
(5) Robustness: After lossy image processing, the extracted image remains nearly identical to the original secret image.