The Effect of Correlogram Properties on Blind Steganalysis in JPEG Images

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\textbf{A R T I C L E I N F O.}

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\textbf{A B S T R A C T}

Blind image steganalysis is a technique for discovering the message hidden in images in an independent manner than embedding the hidden message. The content of the image contribute to the success of steganalysis drastically. In the past, texture, one of the most basic features in any image processing, has been used for content-based image classification. Correlogram properties as textural based features have numerous applications in this field. Homogeneity, contrast, correlation, energy and entropy are the correlogram properties used more frequently than others for this purpose. In this article, the impacts of these properties, as descriptors for image content, on blind steganalysis in JPEG image are investigated. The results indicate that when correlogram homogeneity increases, the false image detection of blind steganalysis increases accordingly; while, decrease in correlogram contrast and entropy, leads to an increase in error. The energy and correlation of correlogram have unspecified effects on image blind steganalysis.

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1 Introduction

Steganalysis is a method for discovering the existence of hidden message in a carrier signal. The hidden message can be embedded into a carrier signal using different method referred to as steganography. If steganalysis method is not used the properties of specific steganography method referred to a blind or universal steganalysis.

The message embedding rate of many steganography methods in JPEG domain depends on the number of non-zero coefficient of Discrete Cosines Transform(DCT). Also, The length of the random message used in steganography is an image capacity ratio\textsuperscript{[1–5]}.

These indicate implicitly that image content influences both the steganography and steganalysis performance.

There is an important question in this field. Which kind of images is more difficult for steganalysis? Two sets of different measures are provided to help select the suitable image. The measures that are stego-cover based and the measures that are cover-based \textsuperscript{[6]}. The first set selects an image which is less affected by message embedding; therefore, image selection is affected by message selection and as the message changes the selected image will change as well. But, the second set is defined on the basis of image content only and independent of the message. Gray level Co-occurrence matrix(GLCM) properties of image is an example of second set of measures, used for image selection from a set of images \textsuperscript{[7]}. Co-occurrence matrix depends on distance and direction which has less impact on steganalysis; therefore, correlogram, generalization for