ABSTRACT

Steganography is one of the techniques used to communicate secret data through the cover media such as images, videos, audio, texts etc. In this work, we consider the algorithms of steganography based on DCT and wavelet transform. The aspects of media quality after hiding the information in the digital media are considered. Particularly, we compare the performance of the prototype algorithms, representing the DCT and wavelet-based image steganography algorithms respectively, using the PSNR, capacity, robustness and accuracy aspects. For video steganography, with various wavelet transforms, we compare the quality of the derived information, when frames are dropped and the effects of payload is studied. The application of using such steganography algorithm which can embed multiple messages, each of which requires a separate key is proposed. The application can estimate the capacity used and capacity remains for the given cover image and texts.

INTRODUCTION

Information hiding is important to applications such as military area (Rocha & Goldenstein, 2008) or the medical image such as a radiological image or Mammogram where a doctor will embed the patient information on the film or image (Li, Li & Wei, 2009). Steganography is a science hiding communicating secret data inside a cover media which can be any format such as text files, images, videos. On the contrary, cryptography attempts to encode the message with keys. The techniques used are such as RSA, DES, AES (Cheddad, Condell, Curram & McKeivitt, 2010). Normally, the message is encrypted first and then hidden in the cover media.
There are a number of aspects which are challenges of steganography, for example, the selected media type, and an encryption method, the algorithm of combining the message to the media. Criteria are considered for selecting embedded algorithms such as the noises of the resulting stego media, the size of the stego media, the robustness of the algorithm through the compression of the stego media etc. Some criteria may be a special case of the type of media such as video where the frame rate needed to be maintained during the transmission etc.

In this chapter, we first intend to make a comparative study of the steganography algorithms based on two types of transformations: DCT and wavelet. Both algorithms are compared in many related aspects: the quality of the stego images in terms of PSNR. Other aspects of comparison are considered such as capacity, accuracy and robustness. We next present the extension to the video steganography with the wavelet transform. Two wavelet transform approaches are considered for video steganography. The experiments compare the PSNR, robustness, and capacity of the stego video for these wavelet-based approaches. At last, we present an application of the approach combining with the hierarchical access control.

BACKGROUND

Steganography is a science that involves communicating secret data in a media. Figure 1 summarizes the fields in information hiding (Cheddad, Condell, Curram & McKevitt, 2010). It shows the relations between steganography, watermarking and cryptography. While watermarking focuses on copyrighting the media, the steganography emphasizes on the hiding message on the media (Stanescu, Borca, Groza & Stratulat, 2008). These techniques may be closed to each other while the metrics considered for both are different.

The media for hiding message can be many kinds as shown in Figure 2 (Morkel, Eloff, & Oliveira, 2005). Also the hidden message may be of many kinds such as a text, an image, an audio file etc.
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