Reversible Data Hiding in Encrypted Images using Interpolation-based Distributed Space Reservation

Abstract:

Reversible data hiding (RDH) in encrypted images has attained more attention recently in research community. Privacy protection of additional data as well as cover media makes it attractive for applications in medical imaging, cloud storage, forensics etc. In this paper, a new method for reversible data hiding in encrypted images (RDH-EI), is proposed. Our method adopts the approach of reserving sufficient space for the additional data before encrypting the cover image. First we identify suitable blocks for hiding data from various parts of the image. Before encrypting the image, one or more LSB-planes of these blocks are backed-up into remaining parts of the image using a high-performing traditional RDH method that works on unencrypted images. After encrypting the image, those LSBplanes are used to hide additional data. Recovery of original cover image and error-free extraction of additional data is guaranteed always.

Introduction:

Reversible data hiding (RDH) involves hiding data into a cover medium in a manner that the original cover medium can be recovered from the distorted stego medium. This has been a focus area of research for decades. Method patented by Barton is one of the earliest techniques in RDH. It was used for authentication of digital content using digital signature embedded into the content. Theoretical analysis on capacity limits of RDH is done by Kalker et al. RDH is performed using different kinds of cover media such as images, videos, audio etc. Among them, digital image have been a popular choice as cover medium. RDH using digital images finds application in military imaging, medical imaging, forensics etc. since permanent distortion to cover image is unacceptable in these areas.

If the data hidden is some information related to cover medium itself, it is called watermarking. This is usually done for authentication and copyright protection. A classification of reversible watermarking schemes is done by Feng et al.This is generally applicable to RDH also. First category uses technique known as difference expansion as in case of. These methods generally

work by expanding small values, such as neighboring pixel difference, to embed additional bits. Second category of techniques uses compression of cover medium to find room for additional data. Histogram shifting is used in the third category of techniques. Some of the recent techniques use a combination of the above three approaches.