

ABSTRACT

Modern communication systems are changing expeditiously due to the significant development of Internet technology and digital communication. Today, multimedia documents like audio, video, and images are easy to store, manipulate and transmit through the Internet by exploiting the benefits of digital technology and communication. But, these documents can be changed by intruders, which gives rise to a violation of authenticity. This unauthorized modification is becoming an issue in many human-centric applications where authentication, copyright protection, and tamper detection are essential. To solve such problems one can use digital watermarking scheme. Digital watermarking is the process of embedding an invisible watermark within a digital image (cover image). Watermarks have been used for postage stamps, currency, and other government documents. Many watermarking algorithms were developed to solve the unauthorized modification problem of digital data. Existing algorithms or methods have some advantages and disadvantages.

In this dissertation, six secured, robust, and reversible watermarking schemes have been introduced using weighted matrix (WM), cellular automata (CA), local binary pattern (LBP), and Lagrange interpolation polynomial (LIP) to address the problem of ownership identification, image authentication, tamper detection and localization. Moreover, the proposed schemes have been analyzed considering ten different geometric and steganographic attacks such as salt and pepper, cropping, opaque, copy-move forgery, median filtering, blurring, rotation, flipping, inversion, and JPEG compression. It is found that the developed algorithms can sustain against such attacks. In addition to the sustainability, our developed schemes provide high embedding capacity with good visual quality which is acceptable in various real-life applications like medical image processing, military application, etc. A shared secret key has been introduced to enhance the security of all the developed schemes. Finally, all the methods are compared with some state-of-the-art watermarking methods, and considerable improvements have been observed.