REVERSIBLE WATERMARKING OF DIGITAL IMAGES: ALGORITHMS AND IMPLEMENTATION

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Abstract

Reversible watermarking is a class of digital watermarking that not only authenticates multimedia data content, but also helps to maintain perfect integrity of the original multimedia cover data. In general watermarking schemes, the cover data undergoes some distortions, although minimal and perceptually negligible in most cases. By reversible watermarking, zero–distortion of the cover data can be achieved, that is, the cover data can be retrieved bit–by–bit. Such a feature is desirable when highly sensitive data is watermarked, e.g. in military, medical and legal imaging applications. In this work we establish the motivation of research on reversible watermarking, by a case study carried out on medical images. Majorly, this research focuses on the development and performance analysis (both theoretical and experimental) of novel techniques for reversible watermarking of digital images. A theoretical framework has been developed, which through statistical modeling can predict closed form expressions for these performance metric limits of reversible watermarking, independent of the algorithm used. In general reversible watermarking algorithms, the convention is to reject the entire cover data at the receiver end if it fails authentication, since there is no way to detect the exact locations of tampering. This feature may be exploited by an adversary to bring about a form of DoS attack. In this research, we also provide a solution to this problem in form of a tamper localization mechanism for reversibly watermarked images, which minimizes the rejection rate of the complete cover data by the receiver and also saves the bandwidth of the communication channel.