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"MULTIPLE BINARY IMAGES WATERMARKING IN SPATIAL AND FREQUENCY DOMAIN"

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Abstract

Watermarking is used for the protection of intellectual property, data integrity, and data authentication. Image watermarking is based on embedding multiples watermarks in different domain of the image representation (spatial and DCT domains), without any distortion of the watermarked image. In the DCT domain a proper choice of the DCT coefficients based on the quantization JPEG table in the middle frequencies band is carried out. Several watermarks were embedded in these two domains in order to take advantage of the spatial domain robustness against different asynchronous attacks, associated to the DCT domain robustness against jpeg compression and some other signal processing distortions. Experimental results show that the proposed method is robust against a large set of synchronous and asynchronous image attacks such as filtering, lossy compression, cropping and rotation attack.

The need for a robust method that protects owner rights againstunintended or malicious stealing, which has arisen because of the rapidincrease of Internet data exchange and multimedia use, in addition to International electronic commercial services and the multimedia that itcontains, has become a substantial constraint to the research in thisdomain. This paper proposes a novel method for image watermarking based on embedding multiple identical watermarks in different domainsof the image representation: i.e. spatial and DCT domains, withoutany distortion of the watermarked image. In the spatial domain, theprocessing method uses a non-linear neural network segmentation to output the different zones of watermark embedding with respect to theimage characteristics. Basing on this study, we compute the appropriate variable embedding gain factors chosen within the limit of the perceptibility threshold. However, in the DCT domain, different DCTblocks coefficients are selected with respect to the JPEG table quantization values in the middle frequency band in order to decrease the image distortions and increase the watermark robustness. Fifteen watermarks are created and embedded in these two domains in order totake advantage of both spatial domain robustness (i.e. against different asynchronous attacks), and DCT domain robustness (i.e. against jpeg compression and some other distortions). After different STIRMARKattacks, experimental results show that the proposed method is robustagainst several synchronous and asynchronous image attacks such asfiltering, lossy compression, rotations, etc. The well-chosen locationsof the different recurring embedded watermarks with variable gain factors in addition to the studied selection of the used DCT coefficients where the watermarks are coded proved that all or some watermarks.