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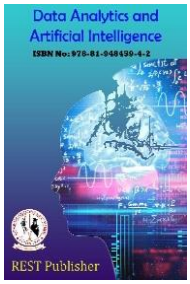

An Inspection on Multiplicative Watermark Decoder in Contour let Field

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Abstract: *Digital watermarking has been projected as a process of copyright protection of text, images, audio and video. We suggest using the recently established transform used in two dimensional signals called contour let transform designed for image watermarking application. Although high frequency components are appropriate for robustness, invisibility criterion forces that pixel selection is based on pure high frequency consideration to further parameters. Contour lets can decompose the image into directional subb ands and its number of directions can be chosen according to the requirement. The result shows that contour let is an effective representation for watermarking images most of them containing lot of texts, graphs and curves. Since human visual system is little sensitive to the edges of image, watermarking technique is used in contour let domain, which describe the edges of the image sparsely. Contour let transform afford a flexible multi resolution representation of the images. The exclusive properties of contour let transform are that we can identify the number of directional decompositions necessary for each and every stage of multi resolution pyramid.*

Keywords: *Multiplicative watermark, cryptography, contourlet domain, Gaussian, discrete cosine transform, discrete wavelet transform.*

1. INTRODUCTION

The growing of digitized media (audio, video and image) is producing a vital need for copyright enforcement. Scheme that care for copyright ownership. Usual cryptographic systems allow only suitable key holders have rights over encrypted data, but there is no way to track its reproduction or retransmission if the data is decrypted. Conventional cryptography therefore provides tiny protection not in favor of data piracy, in which a publisher is faced with unauthorized reproduction of information. A digital watermark is planned to balance the cryptographic processes. It may be visible, or preferably invisible, and the identification code is permanently embedded in data, that is, it remains same within the data after any decryption process. In Past decades, imaging technology and applications have significantly represented as multimedia information is stored, acquired and distributed in digital format. Digital processing and transmission have key advantages, but problems can occur due to the ease with which digital information is reproduced and distributed. Original multimedia information, such as digital images, music or video, is easily copied without any loss of fidelity and it can be readily distributed to unauthorized users. Traditional methods for the prevention of illegal use of digital multimedia data include the addition of access control headers, the encryption of the original data, and other copy protection techniques. These techniques do notprovideasuccessfulwayofsecuringintellectualpropertyrightsasthe original data remains vulnerable once the copy right control mechanisms are exceeded. The complexity of optimum decoding and detection of a multiplicative, multi bit watermark embedded in the magnitude of the DFT coefficients of the host image. Multiplicative water marking is one of the most powerful approaches for copyright protection where the water mark is served as a verification code. While this technique is image content dependent, higher robustness is reached than other techniques such as additive water marking methods. The correlation detector is used for multiplicative water marking; however, this type of detection is not appropriate when the watermarking is performed in the transform domain.

2. LITERATURE SURVEY

I. J. Cox et al[1]discussed a secure (tamper-resistant) algorithm for watermarking images, and a methodology for digital watermarking that may be generalized to audio, video, and multimedia data. We advocate that a watermark should be constructed as an independent and identically distributed (i.i.d.) Gaussian random vector that is imperceptibly inserted in a spread-spectrum-like fashion into the perceptually most significant spectral components of the data. We argue that insertion of a watermark under this regime makes the watermark robust to signal processing operations (such as lossy compression, filtering, digital-analog and analog-digital conversion, requantization, etc.), and common geometric transformations (such as cropping, scaling, translation, and rotation) provided that the original image is available and that it can be successfully registered against the transformed watermarked image. In these cases, the watermark detector unambiguously identifies the owner. Further, the use of Gaussian noise ensures strong resilience to multiple-document, or collusion attacks. Experimental results are provided to support these claims, along with an exposition of pending open problems*M. M. Rahman* et al [3] address the Traditional statistical detectors of the discrete wavelet transform (DWT)-based image water marking use probability density functions (PDFs) that show inadequate matching with the empirical PDF of image coefficients in view o f the fact that they use a fixed number of parameters. Hence, the decision values obtained from the estimated thresholds of these detectors provide substandard detection performance. In this paper, a new detector is proposed for the DWT-based additive image watermarking, wherein a PDF based on the Gauss-Hermite expansion is used, in view of the fact that this PDF provides a better statistical match to the empirical PDF by utilizing an appropriate number of parameters estimated from higher-order moments of the image coefficients. The decision threshold and the receiver operating characteristics are derived for the proposed detector. Experimental results on test images demonstrate that the proposed watermark detector performs better than other standard detectors such as the Gaussian and generalized Gaussian (GG), in terms of the probabilities of detection and false alarm as well as the efficacy. It is also shown that detection performance of the proposed detector is more robust than the competitive GG detector in the case of compression, additive white Gaussian noise, filtering, or geometric attack.*J. R. Hernndez* et al[4]discussed a spread-spectrum-like discrete cosine transform (DCT) domain water marking technique for copyright protection of still digital images is analyzed. The DCT is applied in blocks of 8×8 pixels, as in the JPEG algorithm. The watermark can encode information to track illegal misuses. For flexibility purposes, the original image is not necessary during the ownership verification process, so it must be modeled by noise. Two tests are involved in the ownership verification stage: watermark decoding, in which the message carried by the watermark is extracted, and watermark detection, which decides whether a given image contains a watermark generated with a certain key. We apply generalized Gaussian distributions to statistically model the DCT coefficients of the original image and show how the resulting detector structures lead to considerable improvements in performance with respect to the correlation receiver, which has been widely considered in the literature and makes use of the Gaussian noise assumption. As a result of our work, analytical expressions for performance measures, such as the probability of errors in watermark decoding and the probabilities of false alarms and of detection in watermark detection, are derived and contrasted with experimental results *M. Barni* et al [5] address the problem of optimum decoding and detection of a multibit, multiplicative watermark hosted by Weibull-distributed features: a situation which is classically encountered for image watermarking in the magnitude-of-DFT domain. As such, this work can be seen as an extension of the system described in a previous paper, where the same problem is addressed for the case of 1-bit watermarking. The theoretical analysis is validated through Monte Carlo simulations. Although the structure of the optimum decoder/detector is derived in the absence of attacks, some experimental results are also presented, giving a measure of the overall robustness of the watermark when attacks are present. *A. Briassouli* et al [7] addresses issues that arise in copyright protection systems of digital images, which employ blind watermark verification structures in the discrete cosine transform (DCT) domain. First, we observe that statistical distributions with heavy algebraic tails, such as the alpha-stable family, are in many cases more accurate modeling tools for the DCT coefficients of JPEG-analyzed images than families with exponential tails such as the generalized Gaussian. Motivated by our modeling results, we then design a new processor for blind water mark detection using the Cauchy member of the alpha-stable family. The Cauchy distribution is chosen because it is the only non-Gaussian symmetric alpha-stable distribution that exists in closed form and also because it leads to the design of a nearly optimum detector with robust detection performance. We analyze the performance of the new detector in terms of the associated probabilities of detection and false alarm and we compare it to the performance of the generalized Gaussian detector by performing experiments with various test images.*T. M. Ng* et al[8]discussed Digital image watermarks can be detected in the transform domain using maximum-likelihood detection, whereby the decision threshold is obtained using the Neyman-Pearson criterion. A probability distribution function is required to correctly model the statistical behavior of the transform coefficients. Earlier work has considered modeling the discrete wavelet transform coefficients using a Gaussian distribution. Here, we introduce a Laplacian model and establish via simulation that it can result in a better performance than the Gaussian model.*A. Akhaee* et al [9] addressees an

improved multiplicative image water marking system is presented. Since human visual system is less sensitive to the image edges, watermarking is applied in the contour let domain, which represents image edges sparsely. In the presented scheme, watermark data is embedded in directional sub band with the highest energy. By modeling the contour let coefficients with General Gaussian Distribution (GGD), the distribution of watermarked noisy coefficients is analytically calculated. The trade off between the transparency and robustness of the watermark data is solved in a novel fashion. At the receiver, based on the Maximum Likelihood (ML) decision rule, an optimal detector by the aid of channel side information is proposed. In the next step, a blind extension of the suggested algorithm is presented using the patchwork idea. Experimental results confirm the superiority of the proposed method against common attacks, such as Additive White Gaussian Noise (AWGN), JPEG compression, and rotation attacks, in comparison with the recently proposed techniques.*Y. Bian* et al [11] discussed a uniformly most powerful watermark detector, which applies the Bessel K form (BKF) probability density function to model the noise distribution was proposed by Bian and Liang. In this paper, we derive a locally optimum (LO) detector using the same noise model. Since the literature lacks thorough discussion on the performance of the BKF-LO nonlinearities, the performance of the proposed detector is discussed in detail. First, we prove that the test statistic of the proposed detector is asymptotically Gaussian and evaluate the actual performance of the proposed detector using the receiver operating characteristic (ROC). Then, the large sample performance of the proposed detector is evaluated using asymptotic relative efficiency (ARE) and "maximum ARE." The experimental results show that the proposed detector has a good performance with or without attacks in terms of its ROC curves, particularly when the watermark is weak. Therefore, the proposed method is suitable for wave let domain water mark detection, particularly when the watermark is weak. *Hamghalam* et al[12] presents a robust image water marking method based on geometric modelling. In this method, nine samples of the approximation coefficient of the image blocks are utilized to construct a plane in the three-dimensional (3D) space. The authors change the dihedral angle formed between the created plane and the *x*-*y* plane for data embedding. To preserve the imperceptibility of the watermark, geometrical computations are used to minimize the embedding distortion. Maximum-likelihood detector is implemented to extract the watermark in the noisy channel at the receiver side. The authors experimentally determine the probability density function of the embedding dihedral angle for Gaussian samples. Owing to embedding in the dihedral angle between two planes, the proposed scheme has high robustness to gain attacks. In addition, by using the low-frequency components of the image blocks for data embedding, high robustness against noise and compression attacks has been achieved. Experimental results confirm the validity of the theoretical analysis given in this study and show the superiority of the method over similar techniques in this field. The proposed method is also robust to a wide range of attacks, namely Gaussian filtering, median filtering, JPEG compression, Gaussian noise and scaling.

3. CONCLUSION

Multiplicative watermark in image processing areas is efficient and effective task which develop the imperceptibility control of watermarking. Multiplicative watermark in contour let domain is proposed in this literature survey; however, most of them suffer from embedding and extracting the watermark. This survey shows the challenges to be faced to become the design effective. The proposed system executed well in the case of attacks like filtering on images containing lot of graphs, texts and curves.

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