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Adaptive Watermarking Based DCT with Set Partitioning in Hierarchical Trees

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Abstract: *We propose a new adaptive watermarking scheme. One first contribution is a DCT modulation which adaptively takes care of the local specificities of the image content. In this paper, we propose a new adaptive watermarking scheme. One first contribution is a DCT modulation which adaptively takes care of the local specificities of the image content. The suggested scheme uses the embedded watermark to estimate the degradation of cover image under different distortions. The watermarking process is implemented in DCT domain of the cover image. The correlated DCT coefficients across the DCT sub-bands are categorized into Set Partitioning in Hierarchical Trees (SPIHT). Those SPHIT trees are further decomposed into a set of bit-planes. The watermark is embedded into the selected bit-planes of the selected DCT coefficients of the selected tree without causing powerful fidelity loss to the cover image. The experiments will be performed to estimate the image quality in terms of PSNR, wPSNR, JND and SSIM with acquiring high accuracy under JPEG compression, JPEG2000 compression, and Gaussian noise distortion. The results obtained will show that the proposed scheme has good computational capability for practical applications.*
Also we conclude from the experiments that it leads to optimal watermarking conduct. For the performance of this proposed work Image Processing Toolbox under the Matlab software is used.

Keywords:: *DCT, SPIHT, Watermarking, PSNR, Entropy.*

I. INTRODUCTION

Digital watermarking is a process in which little information is embedded within a digital media so that the inserted data becomes part of the publishing. This technique serves a number of purposes such as broadcast monitoring, data authentication, data ratio and so forth. A digital watermarking system must successfully satisfy trade-offs between conflicting terms of perceptual transparency, data capacity and robustness against attacks. These trade-offs are investigated from an information-theoretic context. Watermarks have two categories of roles: In the first category, the watermark is advised as a transmission code and the decoder must retrieve the whole transmitted information correctly. In the second category, the watermark distribute as a verification code. In the latter system, the watermark detector must simply determine the existence of an explicit pattern. In watermarking schemes, the watermark message is embedded in the host signal in distinct ways, for example, additively or multiplicatively. Thus it becomes possible to update the watermark fulfilled, as for example security aspects (e.g., one digital signature or some authenticity codes), at any time without including new image distortions. However, if the reversibility equity relaxes constraints of invisibility, it may also suggest interruption in data protection. In fact, the image is not protected once the watermark is extracted. So, even though watermark deportation is possible, its imperceptibility has to be guaranteed as most applications have a high concern in observance the watermark in the image as long as possible, taking advantage of the continuous protection watermarking attempt in the storage, transmission and also processing of the information. This is the reason why, there is still a need for adaptive approaches that introduce the lowest distortion possible with high embedding capacity. Since the launch of the concept of adaptive watermarking in the Barton patent, several methods have been suggested. Among these solutions, most recent theories use Expansion Embedding modulation, DCT modulation or, more recently, their sequence. One of the main matters with these modulations is to avoid underflows and overflows.

Truly with the addition of a watermark signal to the image, attention must be taken to escape gray level value underflows (negative) and deluge (greater than for a bit depth image) in the watermarked image although minimizing at the same time image distortion. As resolve above, the huge entropy area is good for watermarking embedding and that is the true covered channel. In general, entropy masking in watermarking system experiences three steps. Over recent years, there has been tremendous attempt in order to explain and model the Human Visual System and applying it to different image processing applications. Such attempt has been tested for solving various problems and has resulted in different levels of success. Recently, visual models have been advanced as a result of the efforts taken place in the field of image and video compression, which desire to raise the element of the compression exploiting HVS characteristics. Basically, both image watermarking and image compression are disturbed of the image redundancy, which is to be reduced in the case of compression, while is occupied to enter the mark in the case of watermarking. As a result, visual models devised in the area of image compression can also be suitable to the watermarking problem. Watermark insertion process exploits the weakness of human visual system equity to make the watermark imperceptible with maximal strength. We use Watson visual model as a baseline model to achieve this task. Watson modeled three different properties (weakness) of the human visual system. A digital watermark is a kind of marker covertly embedded in a noise-tolerant signal such as audio or image data. It is typically used to identify ownership of the copyright of such signal. "Watermarking" is the process of hiding digital information in a carrier signal; the hidden information should, but does not need to contain a relation to the carrier signal. Digital watermarks may be used to verify the authenticity or integrity of the carrier signal or to show the identity of its owners. It is prominently used for tracing copyright infringements and for banknote authentication. Like traditional watermarks, digital watermarks are only perceptible under certain conditions, i.e. after using some algorithm, and imperceptible anytime else. If a digital watermark distorts the carrier signal in a way that it becomes perceivable, it is of no use. Traditional Watermarks may be applied to visible media (like images or video), whereas in digital watermarking, the signal may be audio, pictures, video, texts or 3D models. A signal may carry several different watermarks at the same time. Unlike metadata that is added to the carrier signal, a digital watermark does not change the size of the carrier signal. The needed properties of a digital watermark depend on the use case in which it is applied. For marking media files with copyright information, a digital watermark has to be rather robust against modifications that can be applied to the carrier signal. Instead, if integrity has to be ensured, a fragile watermark would be applied. Both steganography and digital watermarking employ steganography techniques to embed data covertly in noisy signals. But whereas steganography aims for imperceptibility to human senses, digital watermarking tries to control the robustness as top priority. Since a digital copy of data is the same as the original, digital watermarking is a passive protection tool. It just marks data, but does not degrade it nor controls access to the data. One application of digital watermarking is source tracking. A watermark is embedded into a digital signal at each point of distribution. If a copy of the work is found later, then the watermark may be retrieved from the copy and the source of the distribution is known. This technique reportedly has been used to detect the source of illegally copied movies.

Adaptive watermarking (RW) methods are used to embed watermarks, e.g., secret information, into digital media while preserving high intactness and good fidelity of host media. It shows an important role in protecting copyright and content of digital media for precise applications, e.g., medical and military images. Although researchers proposed some RW methods for assorted media, e.g., images, audios, videos, and 3-D meshes; they assume the transmission channel is lossless. The robust RW (RRW) is thus a impose task. For RRW, the essential objective is to accomplish watermark embedding and extraction in both lossless and loss status. As a result, RRW is required to not only recover host images and Watermarks without distortion for the lossless medium, but also resist unintentional attacks and extract as many watermarks as possible for the noised channel. Recently, a dozen of RRW methods for digital images have been proposed, which can be confidential into two groups: histogram rotation (HR)-based methods and histogram distribution constrained (HDC) methods. The HR-based methods, achieve robust loss-less embedding by slightly rotating the cancroids vectors of two random sectors in the no overlapping blocks. Due to the close correlation of neighboring pixels, these methods were reported to be robust across JPEG compression. However, they are sensitive to salt-and-pepper noise, which leads to poor optical quality of watermarked images, and impedes lossless recovery of host images and watermarks. To solve this problem, the HDC forms have been developed in spatial-and wavelet-domains, which divide image blocks into different types and embed the balance watermarks for each type based on histogram distribution. Unfortunately, these methods go through from unstable reversibility and robustness according to. In summary, the above analysis shows that both kinds of RRW methods are not readily applicable in practice.

New approach is proposed that well meets our research goal. In the proposed scheme, the adaptive watermark embedding power is estimated by analyzing the quality degradation characteristics of the cover image and no iterative adjustment loops are used, which significantly improves the computational efficiency and theoretically makes the proposed scheme applicable to real-time video quality estimation. Moreover, the strategies including the HVS masking are used to guide the watermark embedding process. With the proposed scheme, the quality of the watermarked images referring to the original images.

The proposed scheme is based on adaptive watermarking and tree structure in the DCT domain. Recently, the Set Partitioning in Hierarchical Trees (SPIHT) has become one of the best popular image and video coding method because of its efficiency which is accomplished by exploiting the inherent harmony across the sub bands in the wavelet decomposed image. The DCT and SPIHT together provide a good summarization of local region characteristics of an image which is important for adaptive watermark embedding. In this proposed scheme, all the correlated DCT coefficients across the sub bands are grouped together using the SPIHT tree structure. The DCT decomposed image is further decomposed into a set of bit-plane images. In this case, each DCT coefficient is decomposed into a sequence of binary bits. The binary watermark bits are installed into the selected bitplanes of the selected DCT coefficients of the selected trees. Therefore, the robustness of the watermark is controlled by two factors:

(a) The percentages of the watermark bits embedded into the three DCT levels, respectively, and,

(b) The selection of bit planes for watermark embedding.

Thus, for different selected trees, the watermark embedding strengths are different.

II. LITERATURE SURVEY

Sha Wang, Dong Zheng, Jiying Zhao, *Member, IEEE*, Wa James Tam, and Filippo Speranza in 2014. Image quality evaluation is very important. In applications involving signal transmission, the Reduced- or No-Reference quality metrics are generally more practical than the Full- Reference metrics. In this study, we propose a quality estimation method based on a novel semi-fragile and adaptive watermarking scheme. The proposed scheme uses the embedded watermark to estimate the degradation of cover image under different distortions. The watermarking process is implemented in DWT domain of the cover image. The correlated DWT coefficients across the DWT sub bands are categorized into Set Partitioning in Hierarchical Trees (SPIHT). Those SPHIT trees are further decomposed into a set of bitplanes. The watermark is embedded into the selected bitplanes of the selected DWT coefficients of the selected tree without causing significant fidelity loss to the cover image. The accuracy of the quality estimation is made to approach that of Full-Reference metrics by referring to an "Ideal Mapping Curve" computed *a priori*. The experimental results show that the proposed scheme can estimate image quality in terms of PSNR, wPSNR, JND and SSIM with high accuracy under JPEG compression, JPEG2000 compression,Gaussian low-pass filtering and Gaussian noise distortion. The results also show that the proposed scheme has good computational efficiency for practical applications.

1. Amir Houman Sadr and Shahrokh Ghaemmaghami in 2010. He proposed Robustness Enhancement of Content-Based Watermarks Using Entropy Masking Effect. In this paper, we have discussed the entropy masking effect, which was initially introduced by Watson et al, and utilized it to improve the watermark power in content-based watermarking schemes. The proposed method leads to enhancement of the watermark's robustness against various intentional and unintentional attacks. We tried our method to be as simple as possible, because of the computational constraints in video watermarking

SIDHAM ABHILASH, S M SHAMSEERDAULA in 2013. He proposed A Novel Lossless Robust Adaptive Watermarking Method for Copyright Protection of Images. Robust adaptive watermarking (RRW) methods are popular in multimedia for protecting copyright, while preserving intactness of host images and providing robustness against unintentional attacks. However, conventional RRW methods are not readily applicable in practice.

That is mainly because:

1) they fail to offer satisfactory reversibility on large-scale image datasets;

2) they have limited robustness in extracting watermarks from the watermarked images destroyed by different unintentional attacks; and

3) some of them suffer from extremely poor invisibility for watermarked images.

There-fore, it is necessary to have a framework to address these three problems, and further improve its performance. This paper presents a novel pragmatic framework, wavelet-domain statistical quantity DWT and clustering (WSQH-SC). Compared with conventional methods, WSQH-SC ingeniously constructs new watermark embedding and extraction procedures DWT and clustering, which are important for improving robustness and reducing run-time complexity. Additionally, WSQH-SC includes the property-inspired pixel adjustment to effectively handle overflow and underflow of pixels. This results in satisfactory reversibility and invisibility. Furthermore,

to increase its practical applicability, WSQH-SC designs an enhanced pixel-wise masking to balance robustness and invisibility. We perform extensive experiments over natural, medical, and synthetic aperture radar images to show the effectiveness of WSQH-SC by comparing with the histogram rotation-based and histogram distribution constrained methods. Index Terms— Integer wavelet transform, k-means clustering, masking, robust adaptive watermarking (RRW).

Seong-Whan Kim & Shan Suthaharan in 2008. He proposed An Entropy Masking Model for Multimedia Content Watermarking. Inserting maximal allowable transparent watermark, which in turn is extremely hard to attack with common image processing operations, is important aspect of watermark design. We present a new watermark design tool for digital images and digital videos that are based on human visual system (HVS) characteristics. In this tool, basic mechanisms of inhibitory and excitatory behavior of HVS cells are used to determine image dependent upper bound values on watermark insertion. This allows us to insert maximal allowable transparent watermark, which in turn is extremely hard to attack with common image processing, Motion Picture Experts Group (MPEG) compression. As the number of image details (e.g. edges) increases in an image, the HVS decreases its sensitivity to the image details. Similarly, the HVS decreases its sensitivity to the object motions as the number of motion increases in a video signal. We model this decreased sensitivity to the image details and object motions as an entropy masking. Entropy masking model can be efficiently used to increase the robustness of image and video watermarks. We have shown that our entropy-masking model provides watermark scheme with increased transparency and henceforth increased robustness.

III. PROPOSED WORK

- To propose an enhanced Watermarking by DCT with SPIHT (Set Partitioning in Hierarchical Trees).
- To propose an Enhanced watermarking algorithm which is more accurate.
- To propose an Enhanced algorithm that assures quality of result.
- It doesn't degrade the quality of image.
- It has enhanced performance.
    - It has better PSNR and entropy results.
    - It has lesser MSE and BER results.

IV. CONCLUSION

We propose a new adaptive watermarking scheme. One first contribution is a DCT modulation which adaptively takes care of the local specificities of the image content. By applying it to the image prediction-errors and by considering their immediate neighborhood, the scheme we propose inserts data in textured areas where other methods fail to do so. Furthermore, our scheme makes use of a classification process for identifying parts of the image that can be watermarked the most suited adaptive modulation. This classification is based on a reference image derived from the image itself, a prediction of it, which has the property of being invariant to the watermark insertion. In that way the watermark embedded and extractor remain synchronized for message extraction and image reconstruction. Image-Adaptive watermarking systems exploit visual models to adapt the watermark to local properties of the host image. This leads to a watermark power enhancement, hence an improved resilience against different attacks, while keeping the mark imperceptible. Visual models consider different properties of the human visual system, such as frequency sensitivity, luminance sensitivity and contrast masking. In this paper we have utilized SPIHT to improve the robustness of Image-Adaptive watermarks while keeping their transparency. Experimental results show a significant amount of enhancement to the power of watermark. The work has been expanded to video watermarking, considering special properties of the DCT with SPIHT.

REFERENCES

[1]. Sha Wang, Dong Zheng, Jiying Zhao, Wa James Tam, and Filippo Speranza "Adaptive Watermarking and Tree Structure Based Image Quality Estimation" *IEEE TRANSACTIONS ON MULTIMEDIA*, VOL. 16, NO. 2, FEBRUARY 2014

[2]. D. Coltuc, "Improved embedding for prediction-based adaptive watermarking," IEEE Trans. Inf. Forensics Security, vol. 6, no. 3, pp. 873–882, Sep. 2011.

[3]. H. J. Hwang, H. J. Kim, V. Sachnev, and S. H. Joo, "Adaptive watermarking method using optimal histogram pair shifting based on prediction and sorting," KSII, Trans. Internet Inform. Syst., vol. 4, no. 4, pp. 655–670, Aug. 2010.

[4]. W. Pan, G. Coatrieux, N. Cuppens, F. Cuppens, and C. Roux, "An additive and lossless watermarking method based on invariant image approximation and Haar wavelet transform," in Proc. IEEE EMBC Conf., Buenos Aires, Argentina, 2010, pp. 4740–4743.

[5]. V. Sachnev, H. J. Kim, J. Nam, S. Suresh, and Y.-Q. Shi, "Adaptive watermarking algorithm using sorting and prediction," IEEE Trans. Circuit Syst. Video Technol., vol. 19, no. 7, pp. 989–999, Jul. 2009.

[6]. G. Coatrieux, C. Le Guillou, J.-M. Cauvin, and C. Roux, "Adaptive watermarking for knowledge digest embedding and reliability control in medical images," IEEE Trans. Inf. Technol. Biomed., vol. 13, no. 2, pp. 158–165, Mar. 2009.