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A Review on Blind Watermarking Technique for Copyright Protection of Image based on DCT, DWT and SVD Domain

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Abstract: With the rapid use of digital data in information technology and multimedia, piracy and malicious manipulations have become a common concern, thus it is inevitable that the digital content is protected. Hence copyright protection has become a vital issue. Digital watermarking has emerged as a solution to this problem. In this paper, a watermarking technique is proposed and implemented. In which the original image is sorted out to another form by applying zigzag process followed by DCT and SVD. Watermark is then embedded by modifying the singular values and extraction of watermark is the inverse process of embedding. As Advancing techniques are increasing in data communication, the problem of handling the intruder is becoming tedious. Image watermarking provides rigid security by authentication and copyright protection. There are different image watermarking techniques in Spatial and frequency domains. The gives good Peak Signal to Noise Ratio (PSNR) which ensures good imperceptibility and Normalized Cross Correlation (NCC) which ensures more robustness against different kinds of noise such as Histogram equalization, JPEG compression, Speckle noise, Gaussian noise, Salt and Pepper noise, Cropping, Rotation, Sharpening and so on.

Keywords: Watermarking, data hiding, protection, DCT, SVD

Literature Survey:

Satendra kumar et al. (2012) proposed that as the popularity of digital media is growing, and world is becoming smaller, all due to the internet connectivity and WWW phenomena, the copyright protection of intellectual properties have become a necessity for prevention of illegal copying and content integrity verification. So, to achieve these requirements, a hybrid digital image watermarking scheme based on discrete wavelet transform (DWT) and singular value decomposition (SVD) proposed approach in this paper. To increase and control the strength of the watermark, a scale factor value is used. The watermark is not embedded directly on the wavelet coefficients but rather than on the elements of singular values of the cover image with modifying three level Discrete wavelet transform (DWT) HL and LH sub bands.

Dr. Amit Verma et al. (2016) proposed The data that is encrypted by employing the watermarking techniques may be visible or non-visible depending upon the type of technique used. The techniques of watermarking have undergone several changed with time and this has improved the efficiency of hidden data which in turn have improved the reliability of the system. Watermarking was done earlier in images for encrypting or hiding data and was used purposely for authentication. It was with the advent of time that watermarking was used for transmitting data securely so that no other user except the authorized person has the access to that data. Image watermarking was done earlier but now video watermarking is also done. The introduction of video watermarking has taken security to higher levels improving reliability to a certain extent. This paper is a review of different video watermarking techniques. The techniques of video watermarking that have been introduced till date are studied and comparison between all of them is made out to find the best efficient technique. The analysis of the results is done and the implementation is done using the MATLAB software.

Md. Maklachur Rahman et al. (2016) described with the rapid use of digital data in information technology and multimedia, piracy and malicious manipulations have become a common concern, thus it is inevitable that the digital content is protected. Hence copyright protection has become a vital issue. Digital watermarking has emerged as a solution to this problem. In this paper, a watermarking technique is proposed and implemented. In which the original image is sorted out to another form by applying zigzag process followed by DCT and SVD. Watermark is then embedded by modifying the singular values and extraction of watermark is the inverse process of embedding. The deliberated algorithm gives good Peak Signal to Noise Ratio (PSNR) which ensures good imperceptibility and Normalized Cross Correlation (NCC) which ensures more robustness against different kinds of noise such as Histogram equalization, JPEG compression, Speckle noise, Gaussian noise, Salt and Pepper noise, Cropping, Rotation, Sharpening and so on.

Soo-Chang Pei et al. (2016) proposed digital watermark is an important technology for the image verification. Many authors researching on color image watermarking opine RGB color space in the spatial domain is not suitable for embedding marks. In this paper, we propose a digital color image watermarking method using Singular Value Decomposition (SVD). The whole process including embedding and extracting could be finished in RGB components in spatial domain. Simulation results show that our method is successful in resolving the rightful

ownership of the watermarked image with good robustness, good imperceptibility and higher security.

Heng Zhang et al. (2017) described with the development of image processing technology, the copyright protection of digital images has become an urgent problem to be solved. As an effective method, the robust digital water marking technique emerges at a historic moment. Currently, most robust watermarking schemes are performed in the transform domains, such as the discrete cosine transform (DCT) and singular value decomposition (SVD). Compared with spatial domain watermarking schemes, these methods have achieved good performance, such as better robustness and higher security. However, the computational complexity increases with the use of forward and reverse transforms. In this paper, we analyze the SVD-based watermarking scheme and its impact on the spatial domain. Based on this analysis and the mathematical characteristics of SVD, we present a robust image watermarking scheme where a binary watermark is embedded into the largest singular value of each image block in the spatial domain.

M. Shahrezaee et al. (2017) proposed a combination technique of discrete wavelet transform and singular value decomposition to achieve a good image watermarking. Colour images are here utilized for image watermarking. In the proposed method, the main image is first transformed into the wavelet domain and then the watermark is embedded into the reference image after modifying by the singular values of reference image using the singular values of the watermark. Experimental results are then applied by the proposed method for illustrating the system efficiency.

Sachin Gaur et al. (2017) described for improving the robustness and security, a Dual watermarking approach using Redundant Discrete Wavelet Transform (RDWT), block based singular value decomposition (SVD) and Arnold transform is presented. There are two gray scale watermarks, one is Prime watermark and other is Arnold scrambled Second watermark. Second watermark is embedded into the RDWT transformed Prime watermark in all sub bands to get the processed watermark image. After that transformed gray scale cover image is partitioned into non-overlapping blocks for embedding the processed watermark image by modifying the SVD coefficients of each block to obtain the resultant watermarked image. Now a reverse algorithm is developed to takeout the Prime and Second watermark from noisy image. Analysis and experimental outcomes show that the presented method is more robust against numerous image processing attacks and perform better as compared to previously introduced schemes related to presented work.

Soumitra Roy et al. (2017) proposed a dual watermarking approach using Redundant Discrete Wavelet Transform (RDWT), block based singular value decomposition (SVD) and Arnold transform is presented. There are two gray scale watermarks, one is Prime watermark and other is Arnold scrambled Second watermark. Second watermark is embedded into the RDWT transformed Prime watermark in all sub bands to get the processed watermark image. After that transformed gray scale cover image is partitioned into non-overlapping blocks for embedding the processed watermark image by modifying the SVD coefficients of each block to obtain the resultant watermarked image. Now a reverse algorithm is developed to takeout the Prime and Second watermark from noisy image. Analysis and experimental outcomes show that the presented method is more robust against numerous image processing attacks and perform better as compared to previously introduced schemes related to presented work.

Diksha Sang Mitra et al. (2018) proposed the watermark is indistinguishable from the host picture and it ought to be sufficiently powerful to oppose any changes alongside safeguarding the picture quality. Along these lines the watermarking helps in keeping scholarly properties to be open while keeping them for all time water checked. In this paper we have focused on watermarking techniques and checked their robustness against environmental distortions during the storage and transmission of watermarked image. In this work we have applied a hybrid SVD-DCT-DWT watermarking approach in gray biomedical image watermarking to develop a robust algorithm against several image attack. We have also compared our algorithm with two different watermarking technique named as DCT-SVD, DWT-DCT.

Kurniawan Wira Handito et al. (2018) described with internet, anyone can publish their creation into digital data simply, inexpensively, and absolutely easy to be accessed by everyone. However, the problem appears when anyone else claims that the creation is their property or modifies some part of that creation. It causes necessary protection of copyrights; one of the examples is with watermarking method in digital image. The application of watermarking technique on digital data, especially on image, enables total invisibility if inserted in carrier image. Carrier image will not undergo any decrease of quality and also the inserted image will not be affected by attack. In this paper, watermarking will be implemented on digital image using Singular Value Decomposition based on Discrete Wavelet Transform (DWT) and Discrete Cosine Transform (DCT) by expectation in good performance of watermarking result. In this case, trade-off happen between invisibility and robustness of image watermarking. In embedding process, image watermarking has a good quality for scaling factor < 0.1. The quality of image watermarking in decomposition level 3 is better than level 2 and level 1. Embedding watermark in low-frequency is robust to Gaussian blur attack, rescale, and JPEG compression, but in high-frequency is robust to Gaussian noise.

Conclusion: DCT-DWT-SVD based watermarking scheme is gives best performance in the presence of recovery of watermark image used to indicates the text based data of images. The results are verified analytically in terms of PSNR and normalization coefficients and both are high for

novel DCT-DWTSVD watermarking scheme. The work can be extended for considering other image attacks effect and code parameter optimization in terms of additional image attacks. In future effects of compression, transformation and cropping can also be considered for demonstrating the performance of developed watermarking scheme.

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