

An Improved Alpha Blending Technique in DCT&DWT domain using Image Blocking

¹Perna Sharma, ²Vaishali Passi, ³Pankaj Shukla

^{1,2,3}Department of Electronics & Communication, University College of Engineering, Rajasthan Technical University, Kota, India
prernasharma19@gmail.com, vishpassi@gmail.com, shuklapec@rediffmail.com

Abstract— Digital Watermarking is an arm of data obscuring which is employed to multimedia, copyright tribute (protection). It is a technique for engrafting data into digital signal. The efficiency of watermarking summons reckon on the security of visually significant information. In this paper we employed, Alpha Blending technique on the image by sectionalize of an image into quatern quadrants. The interpolation and extraction of the watermark into gray scale cover image is recovered into less complicated way. The proposed method is compared with simple DCT & DWT method by employing statistical parameter such as PSNR, MSE, and RMSE. The observation efforts of watermark image are improved.

Index Terms— Alpha blending technique, DCT, DWT, MSE, PSNR, RMSE.

I. INTRODUCTION

In this mordent era, all the domain of human being, seized by internet and accomplished its stems profoundly. Due to the planetary espousal of internet, almost every mortal on this earth are colligated to the other mortal [1]. The conception of watermarking amounted in 1990's, when the role of internet expanded firmly. The research area in digital watermarking becomes very active in the last several years. Watermarking is an enormous area for copyright of assorted electronic documents and media. Digital watermarking is the operation which can fuse the selective data into the digital signal. A watermark leaves a security on the image; it is the secondary image which is covered on the host image. It is just like a digital key, which provides a sense of ownership and authenticity of image. The other way to explain or to define, a watermark is the digital information which can be engrafted in multimedia target in such a manner that the watermark can be extracted to make an assertion about the object [2]. Watermarking techniques are in the two domains, spatial domain and frequency domain. Transform domain is the second name of frequency domain. Frequency domain method is applicable to the greater extent compared to spatial domain. DCT, DWT, DFT are the ordinarily methods which are applied for engrafting the watermark in spectral coefficient of the image. The cause behind using frequency domain is the characteristics of HVS, which are better captured by the spectral coefficient [3].

DCT watermarking technique, [4] is more robust plus it also resemble to Fourier transform. Information must be present in frequency space instead of amplitude space. DWT can hierarchically decomposed by an image. Essentially DWT is a mathematical tool which is practically for non-stationary signal processing. DWT describe an image in both spatial and

frequency domain. For 2-D image processing 2-D filter can be applied in each proportion. Later on applying 2-D filter image can be dissevered in quatern non-overlapping multi-resolution sub bands. LL, LH, HL, HH coarse-scale coefficient can be represent by LL sub band and LH, HL, HH represent fine scale DWT coefficient.

Bo Shen , Ihwar k. Sethi and Vasudev Bhaskaran [5] propose alpha blending technique by using DCT domain.

Akhil Pratap Singh and Agya Mishra [6] proposed DWT domain watermarking by using alpha domain technique and calculate the PSNR values of recovered image with original image.

Ghazali Bin Sulong Ali Selamat , Mohammed Ibrahim [7] proposed the canny edge detection process by splitting the image into the quatern quadrants and apply DWT and inverse DWT process on it. Apply attacks on the watermarked image and calculate the PSNR value.

Now this paper uses DCT and DWT transform domain by using alpha blending technique. Inverse transform is applied later on the image and watermark image is recovered. Here calculation the PSNR of original and recovered watermark image is also done. Figure 1 explains the block diagram of the proposed scheme.

II. WATERMARK EMBEDDING

In this process first the gray scale host image is taken. After that the gray scale image is spitted into four quadrants. DCT is applied on each quadrant of image. In the same manner DCT is also applied on the watermark image which is to be engrafted in the host image. Alpha Blending technique is used for infixing the watermark into the host image. In this technique the ingredient of host or watermark image is

disintegrated, since DCT is applying which is reproduced by scaling factor and then added

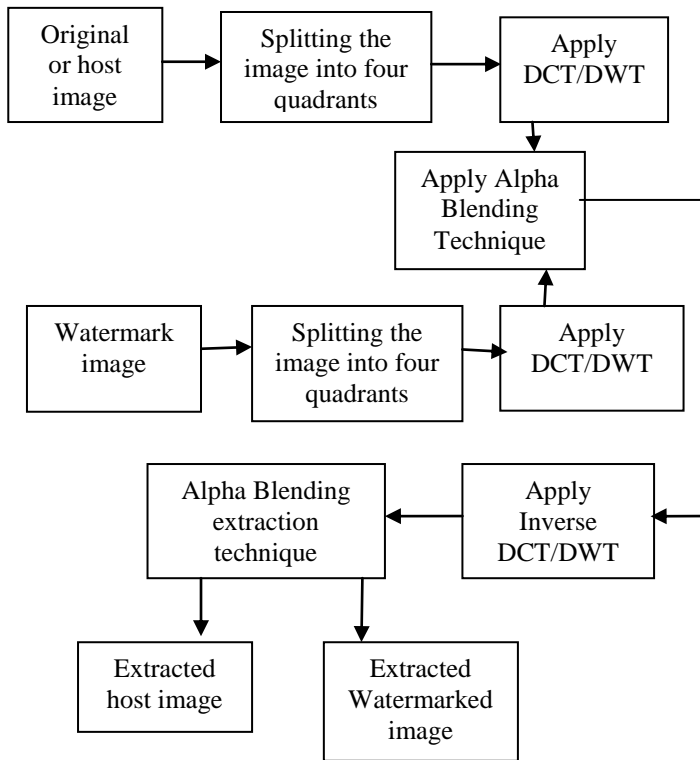


Figure- 1 Block diagram of proposed scheme

III. ALPHA BLENDING TECHNIQUE

Formula for embedding watermark is given by

$$Wat1=a*m1+b*n1 \quad (1)$$

$$Wat2=a*m2+b*n2 \quad (2)$$

$$Wat3=a*m3+b*n3 \quad (3)$$

$$Wat4=a*m4+b*n4 \quad (4)$$

Wat (1...4) == four quadrants of watermarked image,
 m1.....m4== four parts of original image,
 n1.....n4== four parts of watermark image,
 and a and b are the scaling factor.

IV. WATERMARK EXTRACTION

This is the inverse process of embedding process. The inverse DCT is applied on the parts of watermarked image. The result received by deduction from watermarked image so that host image is recovered and merge all the parts of the host image Alpha blending for recovered image

$$Rev1=Wat1-k*m1 \quad (5)$$

$$Rev2=Wat2-k*m2 \quad (6)$$

$$Rev3=Wat3-m3 \quad (7)$$

$$Rev4=Wat4-m4 \quad (8)$$

Rev(1...4)=recovered image,
 Wat(1...4)=watermark image quadrants,
 m(1...4)=host image quadrants,
 k=scaling factor,
 In DWT domain, same steps will be followed.

V. EXPERIMENTAL RESULTS

This paper proposed comparison between DCT to partitioned image DCT and DWT to partitioned image DWT. For both technique gray scale image lena used as host image and text image is used as the watermark. Both the image are of equal size (512X512). k and q are the scaling factors, value s of k and q are used in table I are k=(0.7 to 1.0), q=0.09, 0.009, and 0.0009. Values of k and q are taken in table II k=(0.001 to 0.004), q=0.0009 and 0.00009. The best results in DWT come in k=0.002 and q=0.00009. Figure2 shows the result of DCT domain and Figure 3 shows the results of DWT domain.

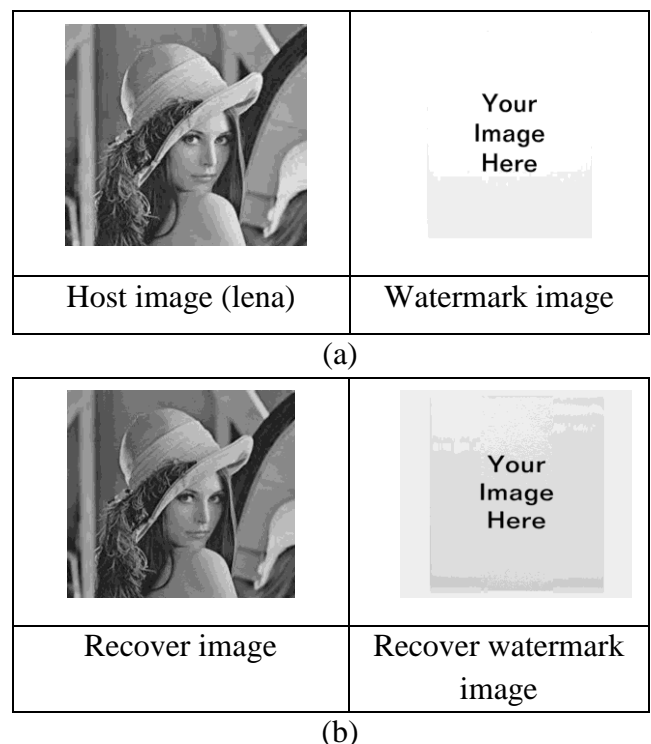


Figure:--2 Results of DCT; (a) images used for embedding
 (b) images from improved DCT recovered

TABLE I: COMPARISON BETWEEN DCT & IMPROVED DCT ALPHA BLENDING TECHNIQUE

Scaling Factor		DCT			DCT Improved		
q	k	MSE	RMSE	PSNR	MSE	RMSE	PSNR
0.09	0.7	2.3253e+004	152.4901	4.499965	1.0019e+004	100.0966	8.156413
	0.8	2.4222e+004	155.6337	4.322727	9.4498e+003	97.2100	8.410581
	0.9	2.5306e+004	159.0801	4.132482	8.9963e+003	94.8487	8.624176
	1.0	2.6507e+004	162.8101	3.931170	8.6588e+003	93.0526	8.790232
0.009	0.7	2.2093e+004	148.6368	4.722270	1.1079e+004	105.2573	7.719752
	0.8	2.2901e+004	151.3301	4.566293	1.0349e+004	101.7293	8.015880
	0.9	2.3825e+004	154.3526	4.394521	9.7345e+003	98.6642	8.281612
	1.0	2.4865e+004	157.6853	4.208973	9.2364e+003	96.1063	8.509766
0.0009	0.7	2.1981e+004	148.2603	4.744300	1.1199e+004	105.8271	7.672865
	0.8	2.2771e+004	150.9018	4.590913	1.0453e+004	102.2401	7.972375
	0.9	2.3678e+004	153.8752	4.421426	9.8227e+003	99.1097	8.242476
	1.0	2.4700e+004	157.1619	4.237856	9.3085e+003	96.4804	8.476021

TABLE II:-- COMPARISON BETWEEN DWT& IMPROVED DWT ALPHA BLENDING TECHNIQUE

Scaling Factor		DWT			DWT Improved		
q	k	MSE	RMSE	PSNR	MSE	RMSE	PSNR
0.00009	0.001	1.9690e+004	140.3220	5.222286	1.9689e+004	1	5.222477
	0.002	1.9683e+004	140.2970	5.223834	1.9682e+004	140.2912	5.224189
	0.003	1.9676e+004	140.2720	5.225381	1.9674e+004	140.2636	5.225900
	0.004	1.9669e+004	140.2470	5.226925	1.9666e+004	140.2360	5.227609
0.0009	0.001	1.9679e+004	140.2817	5.224776	1.9677e+004	140.2747	5.225213
	0.002	1.9672e+004	140.2568	5.226322	1.9669e+004	140.2471	5.226923
	0.003	1.9665e+004	140.2319	5.227866	1.9662e+004	140.2195	5.228632
	0.004	1.9658e+004	140.2070	5.229408	1.9654e+004	140.1919	5.230338

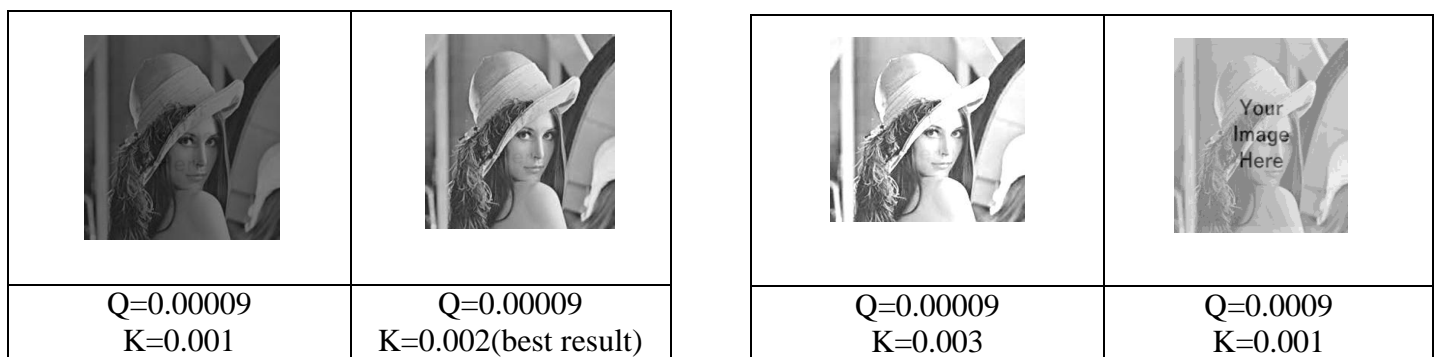


Figure3: Results of DWT

VI. CONCLUSION

This paper presented watermark insertion and extraction by using DCT and DWT alpha blending technique. As the results

shown that the quality of recovered images dependent on the scaling factor 'k' and 'q'. In this paper, comparison is shown

between DCT & Improved DCT and DWT & Improved DWT. The PSNR values of DCT domain technique are much improve then DWT. As per conclusion DCT is better then DWT.

REFERENCES

- [1] Dr. J. Abdul Jaleel, Jisha Mary Thomas : “Guarding Images Using A Symmetric Key Cryptographic Technique: Blowfish Algorithm“, ISSN: 2277-3754 ISO 9001:2008 *Certified International Journal of Engineering and Innovative Technology (IJEIT)* Volume 3, Issue 2, August 2013.
- [2] Mr. Gaurav N Mehta, Mr. Yash Kshirsagar, Mr. Amish Tankariya,“ Digital Image Watermarking: A Review”, *International Journal of Scientific Engineering and Technology* (ISSN : 2277-1581) www.ijset.com, Volume No.1, Issue No.2 pg:169-174 01 April 2012.
- [3] I. J. Cox and M. L. Miller, “Electronic Watermarking: The First Years”. *Fourth, IEEE Workshop on Multimedia Signal Processing*, 2001, pp. 225-230.
- [4] Ansu Anna Ponnachen, Lidiya Xavier, “Dwt Based Watermarking For Lifting Based Compression And Symmetric Encryption Of Jpeg Images”, *International Journal of Engineering Research & Technology (IJERT)* ISSN: 2278-0181 www.ijert.org Vol. 2 Issue 6, June - 2013
- [5] Bo Shen, Iihwar K. Sethi and Vasudev Bhaskaran, (1998),” DCT Domain Alpha Blending”, IEEE
- [6] Akhil Pratap Singh,” Wavelet Based Watermarking On Digital Image “,*Indian Journal of Computer Science and Engineering*Vol 1 No 2, 86-91:
- [7] Ghazali Bin Sulong, Harith Hasan(Corresponding author) , Ali Selamat, Mohammed Ibrahim and Saparudin, “A New Color Image Watermarking Technique Using Hybrid Domain”, *IJCSI International Journal of Computer Science Issues*, Vol. 9, Issue 6, No 1, November 2012 ISSN (Online): 1694-0814 www.IJCSI.org