Composition of Non Blind Multiplicative Watermarking using Translational Attack with 2D-DWT

Ms.Neetu Devi[1], Mr. Yogesh Kumar Agarwal[2] ,Mr.Pradeep kumar jain[3], Dr. Pramod Sharma[4] , Jitesh Kumar Jain[5]

[1] *Research Scholar, Department of Electronics & Communication Engineering, Regional college of engineering & research center, Jaipur, Rajasthan, India*

[2] *Assistant Professor, Department of Civil Engineering, Jaipur Engineering college & research center, Jaipur, Rajasthan, India*

[3] *Assistant Professor, Department of Civil Engineering, Jaipur Engineering college & research center, Jaipur, Rajasthan, India*

[4] *Professor, Department of Electronics & Communication Engineering, Regional college of engineering & research center, Jaipur, Rajasthan, India*

[5] *Assistant Professor, Department of Civil Engineering, Jaipur Engineering college & research center, Jaipur, Rajasthan, India*

Abstract

Digital Watermarking is nowadays one of the most developing area for ownership concern of digital images " Attack Analysis of Non Blind Discrete Wavelet Transformation Based Watermark Embedding and Extraction Algorithm" is one of the digital watermarking algorithm developed for embedding and extraction of watermark, by improving Sreenevisan Algorithm, in which Gaussian random number is utilized as a watermark but in ASG algorithm image is taken as watermark and host image decomposed in frequency transform domain by utilizing the two dimensional discrete wavelet transformation upto one level and then digital watermark as image is embedded in all sub-bands of decomposed image utilizing additive embedding technique. For checking the robustness of the ASG watermarking algorithm tested by attacking watermarked image with Geometric Attack i.e. Translational and Rotational attack and Gaussian noise attack using Matlab. ASG watermarking algorithm withstands all attacks and can be said as robust for all tested attack. But Naveen Kedia algorithm image is taken as watermark and host image decomposed in frequency transform domain by utilizing the two dimensional discrete wavelet transformation up to one level and then digital watermark as image is embedded in all sub-bands of decomposed image utilizing Multiplicative embedding technique. We tried to improve the robustness of ASG algorithm by using Naveen Kedia multiplicative embedding technologies in which decomposing the image upto one level using DWT with db1(Daubachies 1) wavelet transform, then digital watermark as image is embedded in all sub-bands of decomposed image utilizing multiplicative embedding technique. For checking the robustness of the Naveen Kedia watermarking algorithm tested by attacking watermarked image with Geometric Attack i.e Translation attack using Matlab. Then tested watermarking attacks using Naveen Kedia multiplicative algorithms comparing the results with the ASG watermarking attacks.

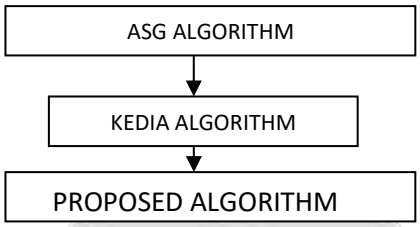
Keywords: *DWT, PSNR, SNR, Watermarking, Robustness, Additive embedding, Multiplicative embedding.*

I. INTRODUCTION

There is a strong need for security services in order to keep the distribution of digital multimedia work both profitable for the document owner and reliable for the customer. Watermarking technology plays an important role in securing the business as it allows placing an imperceptible mark in the multimedia data to identify the legitimate owner, to track authorized user. Digital watermarking is one of the method to maintain the digital ownership management. There are various ways to embed the watermark by various algorithm here we have taken ASG algorithm as base algorithm and compared this algorithm with the Kedia algorithm. After that we analysis the robustness of kedia algorithm by using Translational attack.

II. PREVIOUS WORK

Sreenivasan [1] had Implemented Digital Watermarking using discrete 2-D wavelet transform and Input image is watermarked with a key having Mean = 0 & Variance = 1. This key was generated by utilizing the abstract white Gaussian noise (awgn). Up to my best knowledge this algorithm is available only for embedding the watermark and can be improved for extraction.



ASG algorithm [2], also uses Discrete Wavelet Transform (DWT) and additive embedding strategy for embedding and extracting watermark image from the host image. Kedia[11] Algorithm has attempted to bring out the algorithm of ASG [2] in a better way by using multiplicative embedding strategy for watermark embedding and extraction and then analyzing the PSNR and SNR of the extracted watermark with original watermark and between original image and watermarked image without attack.In Proposed algorithm Kedia Algorithm is analysis & comparisons of ASG & Kedia algorithm by Translational attack with SNR & PSNR Values for test the robustness of the algorithm.

III. RESULT OBTAINED BY KEDIA ALGORITHM

Kedia algorithm imperceptibility evaluated by calculating SNR between original image and watermarked image in Decibels (db), PSNR between original image and watermarked image in Decibels (db), SNR between original watermark and extracted watermark in Decibels(db), PSNR between original watermark and extracted watermark in Decibels(db).[11]

Signal-to-noise ratio (often abbreviated SNR or S/N): It is defined as the ratio of signal power to the noise power. A ratio higher than 1:1 indicates more signal than noise.

Image	PSNR(b/w original Image and watermarked image in Decibal (db))		PSNR(Between original watermarked and Extracted Watermarked in Decibles (db))	
	Kedia Algo	ASG Algo.	Kedia Algo	ASG Algo.
Baboon	48.34	48.32	57.82	37.78
Barb	47.89	47.88	58.76	38.72
Boat	48.64	48.61	57.22	37.18
Girl	45.65	45.62	60.64	40.59
Lena	48.83	48.81	58.01	37.97
Home	46.86	46.85	58.16	38.13
Pari	48.07	-----	59.07	------

Table 1. Without Attacks Values of PSNR of ASG And Kedia Algorithm.

Image	SNR(b/w original Image and watermarked image in Decibal (db))		SNR(Between original watermarked and Extracted Watermarked in Decibles (db))	
	Kedia Algo	ASG Algo.	Kedia Algo	ASG Algo.
Baboon	43.77	43.75	57.34	37.30
Barb	41.52	41.50	58.28	38.72
Boat	44.46	44.43	56.73	37.18
Girl	39.18	39.15	60.16	40.59
Lena	43.46	43.44	57.53	37.97
Home	41.03	41.02	57.68	38.13
Pari	41.34	--------	58.58	----------

Table 2. Without Attacks Values of SNR of ASG And Kedia Algorithm

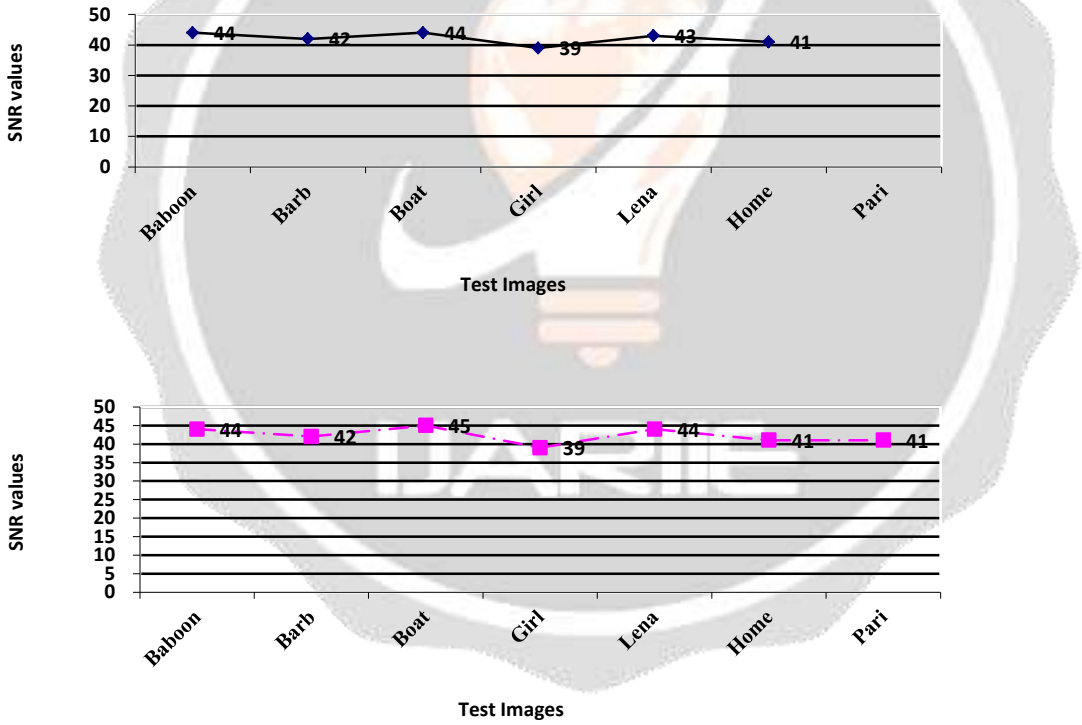


Figure 1. Upper graph shows SNR values between original image and watermarked image for ASG Algorithm and lower graph SNR values between original image and watermarked image for Kedia Algorithm.

Figure 1 shows SNR for various test images show that ratio of SNR is greater than 1:1 ratio for all test images; it means that the value of the signal is greater than the noise.

Noise is the difference between the original image and watermarked image, this difference will show the strength of watermark signal that obscure the original image, least the value of this watermark signal lessen the amount of obscuring the original image i.e. more value of SNR will shows that there is less amount damage in original image.

For both the Kedia algorithm and ASG algorithm simulation result shows that the value of SNR is between 39 to 45 that shows degradation in original test image by the watermark signal is very less.

More value of SNR will show less amount of damage in extracted watermark. For both the Kedia algorithm and ASG algorithm simulation result shows that the value of SNR is between 37 to 60 that shows extracted watermark image degradation is very less after extraction process.[11]

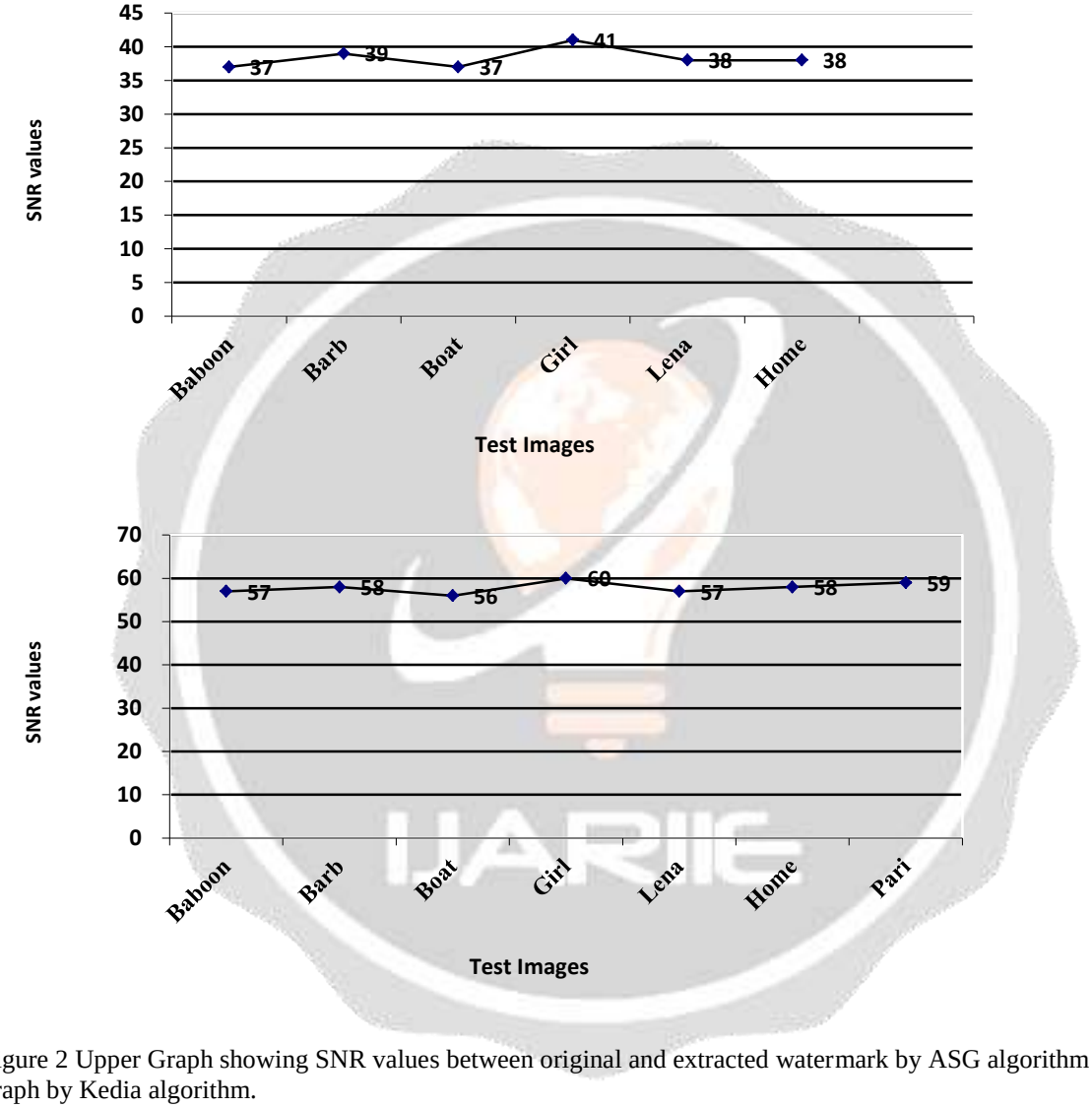


Figure 2 Upper Graph showing SNR values between original and extracted watermark by ASG algorithm and Lower graph by Kedia algorithm.

A. SNR Result Conclusion

(i)The amount of original data presence in watermarked image is more than the background noise. i.e. extracted watermark is recognizable for identity proof.

(ii)Kedia algorithm has higher values of SNR so that we can say that Kedia algorithm has more value of original signal i.e. more matching of the extracted watermark with original watermark so it is better than ASG algorithm.[11]

(iii)Peak signal-to-noise ratio, often abbreviated PSNR, is an engineering term for the ratio between the maximum possible power of a signal and the power of corrupting noise that affects the fidelity of its representation. Because many signals have a very wide dynamic, PSNR is usually expressed in terms of the logarithmic decibel scale [3].

As a measure of quality of reconstruction of lossy compression codecs (e.g., for image compression) PSNR is used. The signal in this case is the original data, and the noise is the error introduced by compression. When comparing compression codecs it is used as an approximation to human perception of reconstruction quality, therefore in some cases one reconstruction may appear to be closer to the original than another, even though it has a lower PSNR (a higher PSNR would normally indicate that the reconstruction is of higher quality). One has to be extremely careful with the range of validity of this metric; it is only conclusively valid when it is used to compare results from the same codec (or codec type) and same content [3].
Typical values for the PSNR in lossy image and video compression are between 20 and 50 dB [3]

IV. RESULT OBTAINED BY PROPOSED ALGORITHM

During transmission and even after reception of watermarked image due to some impairments like introduction of Noise, Image Cropping, Resizing, image get blur and dither, diluted as well as erode which change the position of watermark , sometimes destroy watermark .which is undesirable for owners of image so it become necessary to analyse robustness of watermarking algorithm [4].

.

Image	PSNR(Between original Image and watermarked image after attack in Decibal (db))		PSNR(Between original watermarked and Extracted Watermarked after attack in Decibles (db))	
	Proposed Algo	ASG Algo.	Proposed Algo	ASG Algo.
Baboon	36.72	36.62	76.92	36.96
Barb	37.20	37.12	76.68	36.72
Boat	36.35	36.24	77.01	37.05
Girl	38.04	37.97	76.31	36.33
Lena	36.83	36.73	76.85	36.88
Home	36.94	36.87	76.54	36.57
Pari	37.38	-----	76.55	------

Table 1. Translational Attacks Values of PSNR of ASG And Proposed Algorithm using Kedia algorithm.

Image	SNR(Between original Image and watermarked image after attack in Decibles (db))		SNR(Between original watermarked and Extracted Watermarked after attack in Decibles (db))	
	Proposed Algo	ASG Algo.	Proposed Algo	ASG Algo.
Baboon	36.72	36.62	76.44	36.48
Barb	37.20	37.12	76.20	36.23
Boat	36.35	36.24	76.53	36.57
Girl	37.98	37.91	77.82	35.85
Lena	36.83	36.73	76.36	36.40

Home	36.94	36.87	76.44	36.08
Pari	37.38	--------	76.07	----------

Table 2. Translational Attacks Values of SNR of ASG And Proposed Algorithm using Kedia Algorithm

Result Analysis:

(i) SNR (a) SNR values between original image and watermarked image after translational attack are plotted in Figure 3 for various test images.

From Table 2 average value of SNR for various test images between watermarked image and watermarked image after attack is 36.92 which mean that the quality of the watermarked image is degraded by the attack to a very little extent as the average value of SNR is 42.19 without attack.

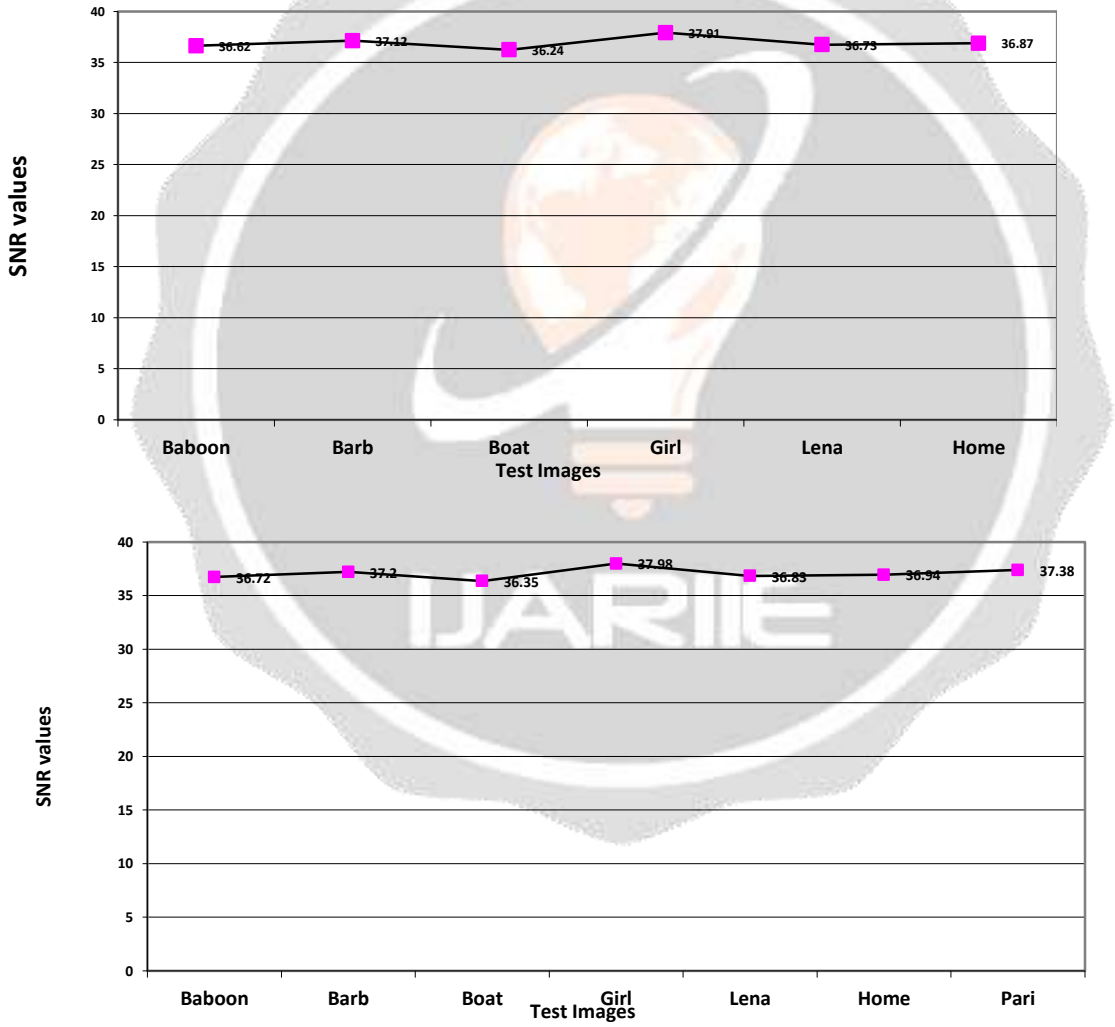


Figure 3 upper Graph showing SNR values between original image and watermarked image after Translational Attack by ASG algorithm and under graph by Proposed algorithm using kedia algorithm.

A. SNR Result Conclusion of Watermarked image withstand the translational attack

(i) SNR values shows that Watermarked image withstands the translational attack either image is watermarked by ASG algorithm or by proposed algorithm.

(ii) SNR values are almost same between original image and watermarked image after translational attack when the host images are embedded with watermark by ASG algorithm or by proposed algorithm, which shows that both algorithm are equivalent.

(b) SNR values between original watermark image and extracted watermark image after translational attack are plotted in Figure 4 for various test images.

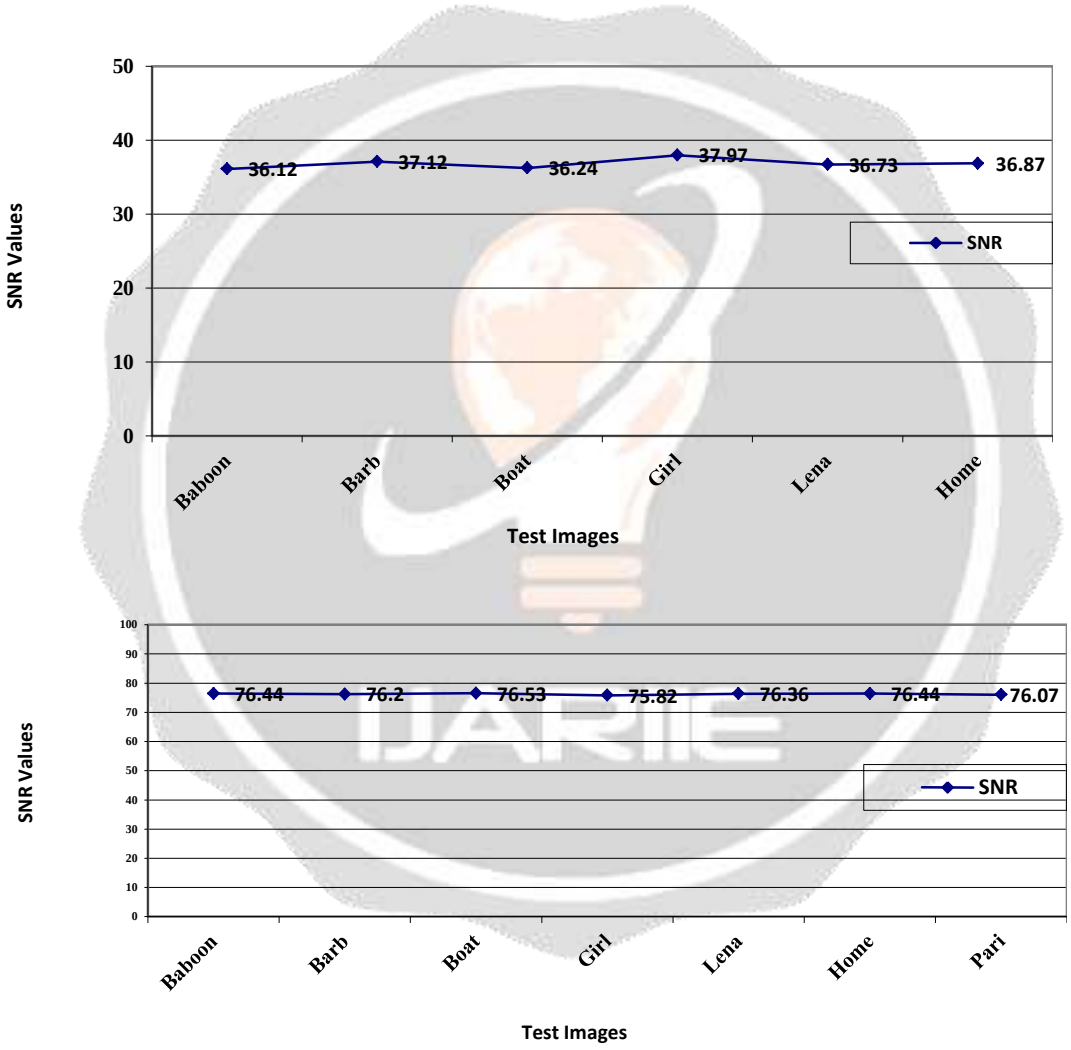


Figure 4 Upper Graph ows SNR values between extracted watermark image and original watermark image after translational Attack byASG algorithm and lower graph by proposed algorithm.

B. SNR Result Conclusion of Extracted Watermark with Translational attack

(i) SNR values shows that Extracted watermark image withstands the translational attack either image is watermarked by ASG algorithm or by proposed algorithm.

(ii) SNR values are far better for proposed algorithm between original watermark and extracted watermark image after translational attack which shows proposed algorithm, ie better than the ASG algorithm.

(ii)PSNR

(a) PSNR values between watermarked image and rotated watermarked image after translational attack are plotted in Figure 11 for various test images.

From Table 2 average value of PSNR for various test images, between watermarked image and watermarked image after attack is in between 36 to 38 which mean that the quality of the watermarked image is not degraded so much by the translational attack.

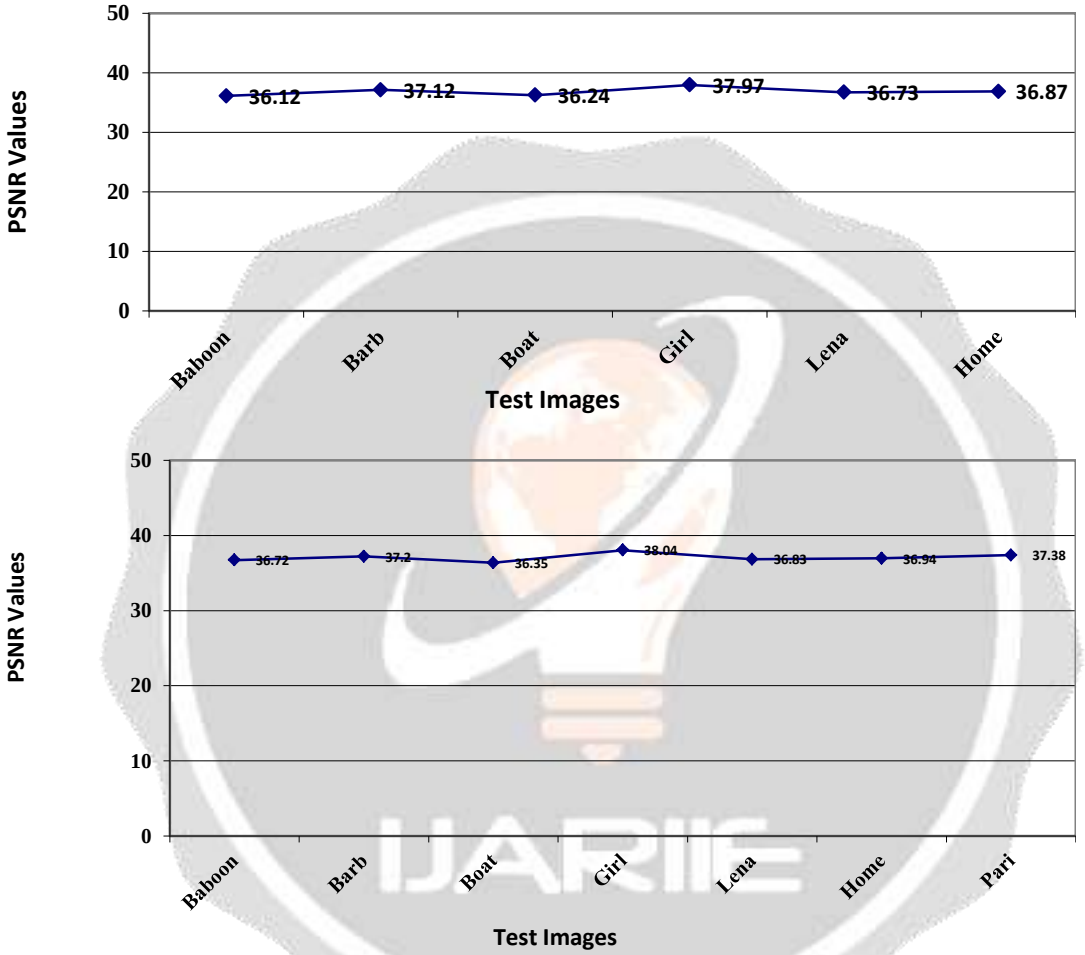


Figure 5 Upper Graph PSNR values between watermarked image and watermarked image after translational Attack by ASG algorithm and lower graph by proposed algorithm.

C. PSNR Result Conclusion of Watermarked image withstand the translational attack

(i) PSNR values shows that Watermarked image withstands the translational attack either image is watermarked by ASG algorithm or by proposed algorithm.

(ii) PSNR values are almost same between original image and watermarked image after translational attack when the host images are embedded with watermark by ASG algorithm or by proposed algorithm, which shows that both algorithm are equivalent for robust against the imperceptibility.

(b) PSNR values between original watermark image and extracted watermark image after translational attack are plotted in Figure 12 for various test images.

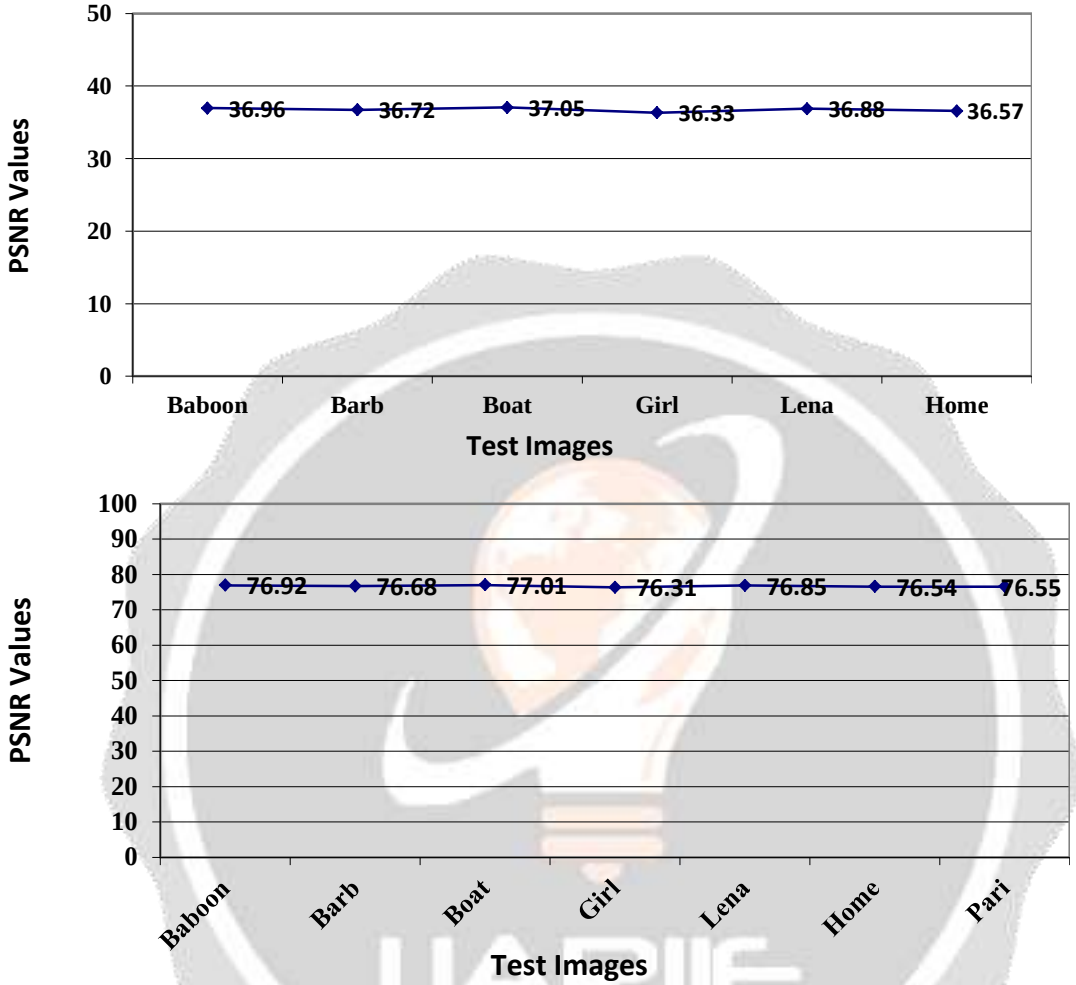


Figure 6. Upper Graph shows PSNR values between extracted watermark image and original watermark image after translational Attack by ASG algorithm and lower graph by proposed algorithm.

D. PSNR Result Conclusion of Extracted Watermark with Translational attack

(i) PSNR values shows that Extracted watermark image withstands the translational attack either image is watermarked by ASG algorithm or by proposed algorithm.

(ii)PSNR values are far better for proposed algorithm between original watermark and extracted watermark image after translational attack which shows proposed algorithm, ie better than the ASG algorithm.

V. CONCLUSION

After attacking the Kedia algorithm with Translational attack and then comparing the PSNR and SNR values with ASG algorithm we found that the Kedia algorithm is far better than the ASG algorithm as we get more values of PSNR and SNR between original watermark and extracted watermark after attack than the ASG algorithm. Similarly we get more values of the PSNR and SNR between original image and watermarked image after attack than ASG algorithm. Also we can say that Kedia algorithm is robust for the Translationalal attack and imperceptible.

VI. REFERENCES

[1] Abhijith Sreenivasan (2007 1 Feb), Simple Watermarking using Wavelet transform, (1st ed), [Online]Availiable:http://www.mathworks.com/matlabcentral/fileexchange/13834-simple-water-marking-using-wavelet-transform.

[2] ASG, "Non blind Discreet Wavelet Transformation based Digital Watermark Embedding and Extraction Algorithm", Master Thesis, Dept. of Comp. Science and Information Technology, Rajasthan Technical University, Kota, Rajasthan, India, 2012.

[3] Wikipedia, Peak Signal to Noise Ratio (44 ed.) [Online] Available: http: // en. wikipedia. org /wiki/Peak_signal-to-noise_ratio.

[4] Navnidhi Chaturvedi, Dr.S.J.Basha ," Analysis of Image Water marking by DWT and Performance Under Attacks" International Journal of Computer Technology and Electronics Engineering (IJCTEE) Volume 2, Issue 3, June 2012.

[5] "Digital watermarking a technology overview" Hebah H.O. Nasereddin,IJRRAS 6 (1) , January 2011

[6] Digital Watermarking Techniques: Literature Review

[7] http://www.digitavid.net/VirtualUniversity/Presentations/ImagingWatermarking.pdf.

[8] Ingemer J.Cox, Joe Killan, Tom Leighton and Talal G. Shamoon, "Secure spread spectrum watermarking for multimedia", IEEE proceeding International Conference on Image Processing, vol.6, pp 1673-1687 Santa Barbara, California, USA, October 1997.

[9] George Voyatzis and loannis Pitas, "Application of toral automorphisms in image watermarking", IEEE proceeding of International Conference on Image processing, vol. 2, pp 237-240, Lausanne, Switzerland, September 1996. IEEE press.

[10] . Thesis on Digital Watermarking in the Wavelet Transform Domain by Peter Meerwald 11, January 2001.

[11] Naveen Kumar Kedia,Saroj Hirenwal," Non Blind Digital Watermarking using 2D- DWT,June 2013", International Journal of Emerging Technology and Advanced Engineering, Volume 3, Issue 6.