INTERNATIONAL JOURNAL FOR RESEARCH PUBLICATION & SEMINAR
ISSN: 2278-6848 | Volume: 11 Issue: 01 | January - March 2020
Paper is available at http://www.jrps.in | Email : info@jrps.in

INTEGRATION OF WAVELET AND HUFFMAN COMPRESSION MECHANISM TO IMPROVE SECURITY WITH FINE IMAGE QUALITY

1Sushant, 2Ms. Deepika
1Research Scholar, Department Of Computer Science, sushantlakhina29@gmail.com
Indus Institute Of Engineering Technology, KUK,
2Asst. Professor, Department Of Computer Science, deepika.ad14@gmail.com
Indus Institute Of Engineering Technology, KUK,

ISSN : 2278-6848 03
9 772278 684800
© International Journal for Research Publication and Seminar

Abstract: Nowadays, there is the requirement of a mechanism which can compress the graphical content without decreasing the quality of image. Therefore, wavelet mechanism has been integrated with Huffman mechanism. These two compression mechanisms are integrated and used to increase the compression ratio and decrease the image size. The content has been compressed as dual layer. Huffman compression has been used on first layer and wavelet mechanism has been used to compress the content at second layer. Two performance parameters are considered to measure the performance of graphical content compression algorithm. The considered parameters are Peak Signal to Noise Ratio and Mean square error. In the research work, the comparison between traditional wavelet based and Huffman based image compression with proposed algorithm is proposed. The proposed integration is beneficial to compress the data without losing its quality.

Keywords: Image Compression, Huffman, Wavelet Mechanism, PSNR, Mean square error

[1] INTRODUCTION

Image compression is known as one sort of data compression. It has been done in order to decrease cost to store such graphical content & transmission. The Algorithms are applied based on visual conception & statistical properties of graphics. Such are used in order to offer superior results. In this process, quality of graphical contents does not get reduced. If there would be graphic content in sort size, user can store data in available size of disk & memory space. There would be decrement in time of transmission of such compressed data via Internet. It reduces downloading time from Web pages.

Fig 1 Digital Image Processing

The process followed to reduce size of graphical contents is known as graphical contents compression. There are two mechanisms to compress image. One is lossy mechanism where quality of graphical contents is degraded. The second mechanism is lossless where quality graphical contents are retained even after graphical contents size reduction. As name indicates, lossless compression mechanism minimizes size but produces no change in image quality. This type of mechanism has been applied in places where quality and precision of graphical data cannot be compromised and is very significant.

[2] IMAGE COMPRESSION USING HUFFMAN CODING

Huffman coding is one of the basic compression technique that has been proven useful in graphical contents & video compression standards. When Huffman encoding mechanism on graphical content is applied, source symbols are pixel intensities related to Image.

Initial step of Huffman coding mechanism is to decrease input graphical data. It is done with help of ordered histogram. Here chances of occurrence of a definite pixel intensity value is as

prob_pixel = numpix/totalnum.

[3] OBJECTIVE

The objective of the research work has been presented here such as

1. To study Huffman based compression mechanism and also consider the limitation.
2. To integrate the wavelet based image compression with Huffman for making increment in compression ratio.
3. To compress and decompress the content on two layers using Huffman and wavelet mechanism.

INTERNATIONAL JOURNAL FOR RESEARCH PUBLICATION & SEMINAR
ISSN: 2278-6848 | Volume: 11 Issue: 01 | January - March 2020
Paper is available at http://www.jrps.in | Email : info@jrps.in

4. PSNR value of final graphical content is measured which is supposed to be high.

[4] WAVELETS IMAGE PROCESSING

A wavelet is a wave-like oscillation with amplitude. It starts at zero, increases. After that it decreases back to zero. It has been basically visualized as a "brief oscillation" as one recorded. It has been done by a seismograph/heart monitor. Basically, wavelets are intentionally crafted to have specific properties. Such make them beneficial for signal processing. With the use of a "reverse, shift, multiply & integrate" technique called convolution, wavelets could be combined with known portions of a damaged signal to extract information from unknown portions.

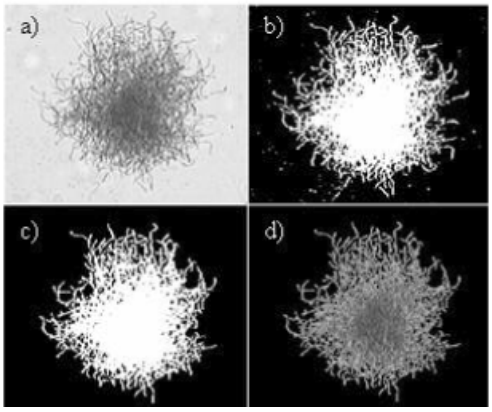

Fig2 Wavelets Image Analysis

[5] RESULT AND DISCUSSION

Here in this chapter, the updated Huffman algorithm to compress an image has been performed. Here, jpeg image shown below has been taken as sample image and Matlab script has been applied on it.

Fig 3 Original image for compression

Original File before applying compression algorithm

To view the size of actual image right clicks on image and view properties.

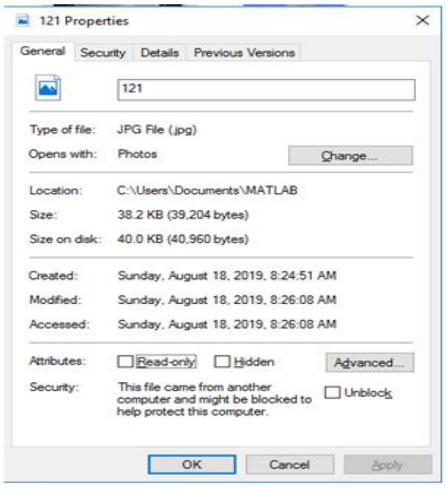

Fig 4 Size of original File

5.2 RUNNING SCRIPT

Before running script following points must be considered.

1. The Code & graphical content must be placed in common folder.
2. The Compressed graphical content would be generated in same folder
3. The decompressed graphical content would be generated in same folder.

5.2.1 Huffman based compression

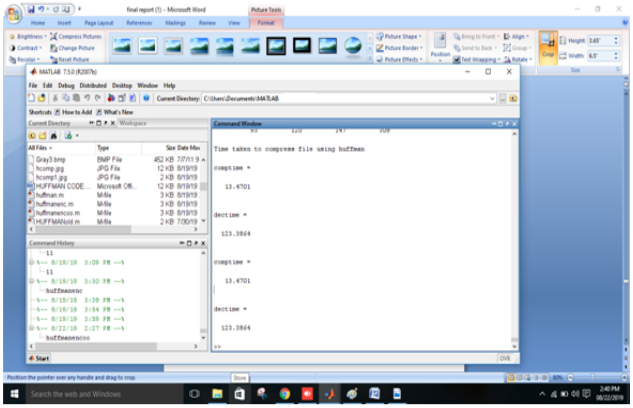

Fig 5 Huffman based compressed and decompressed image

Size of File after applying compression algorithm

INTERNATIONAL JOURNAL FOR RESEARCH PUBLICATION & SEMINAR
ISSN: 2278-6848 | Volume: 11 Issue: 01 | January - March 2020
Paper is available at http://www.jrps.in | Email : info@jrps.in

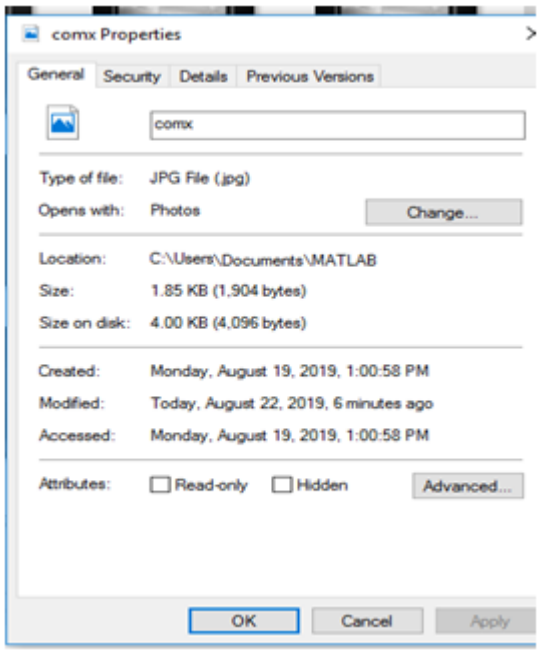

Fig 6 Size of File after applying compression algorithm

Size of File after decompression of image

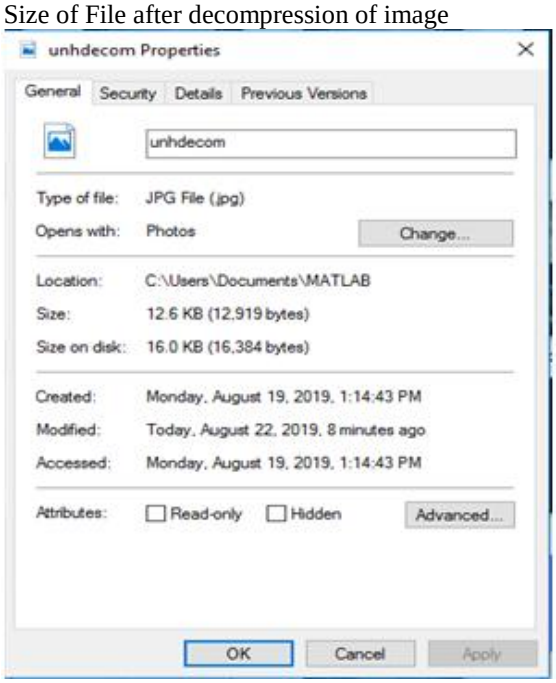

Fig 7 Size of File after decompression of image

5.2.2 Wavlet based compression decompression

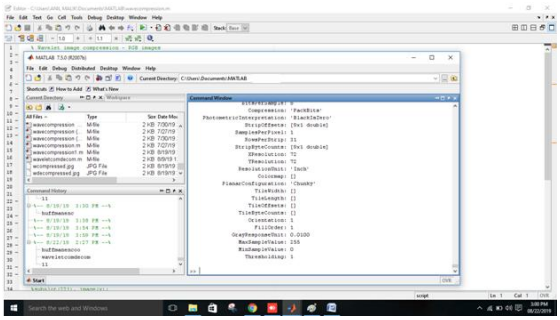

Fig 8 File compression using Wavelet

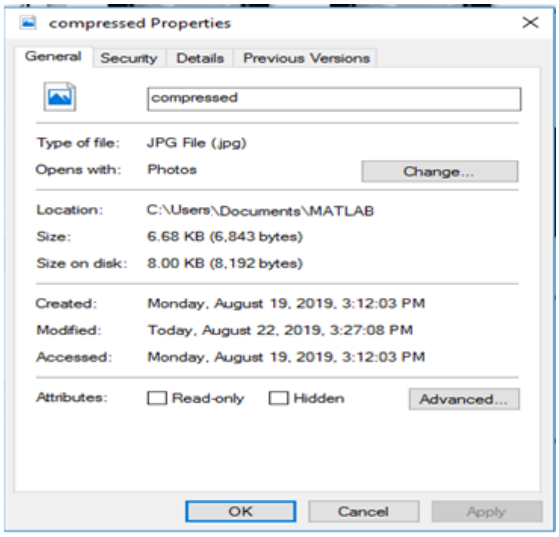

Fig 9 Size of file after compression using Wavlet mechanism

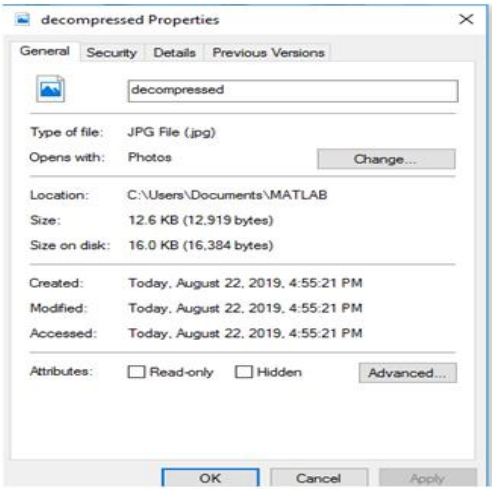

Fig 10 Size of File after decompression using Wavlet mechanism

5.2.3 Proposed file compression implementation

INTERNATIONAL JOURNAL FOR RESEARCH PUBLICATION & SEMINAR
ISSN: 2278-6848 | Volume: 11 Issue: 01 | January - March 2020
Paper is available at http://www.jrps.in | Email : info@jrps.in

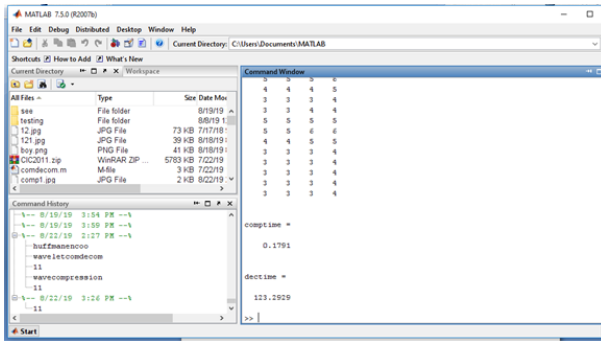

Fig 11 File compression using proposed model

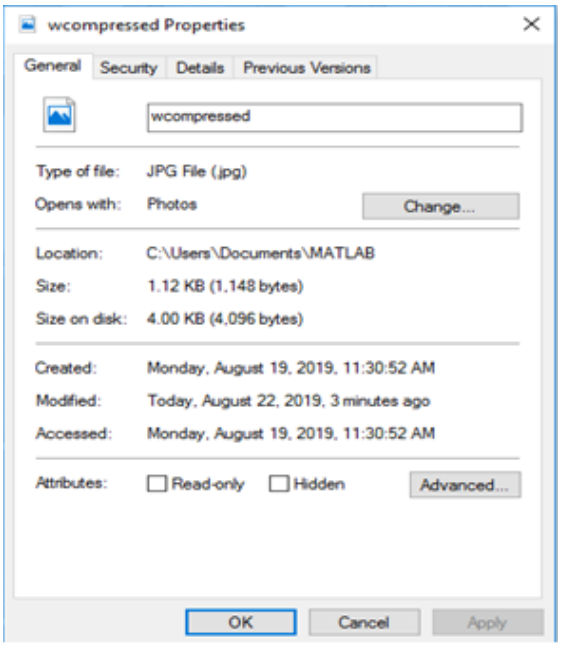

Fig 12 Size of file after compression using proposed mechanism

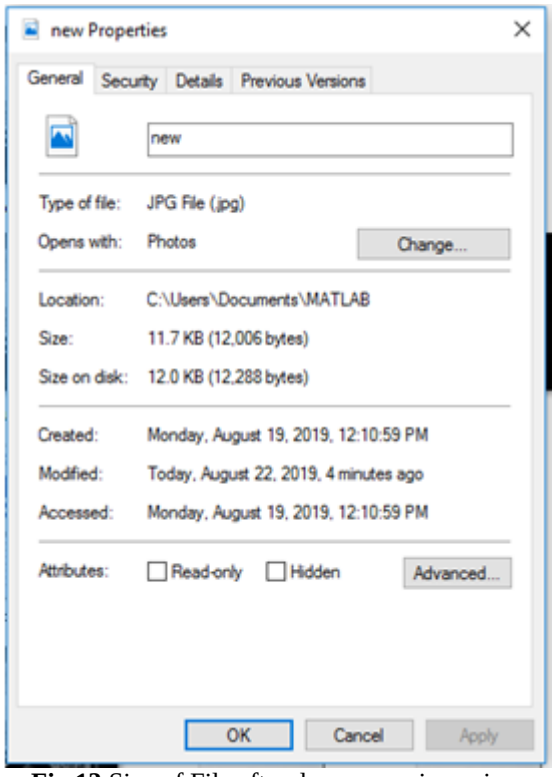

Fig 13 Size of File after decompression using proposed mechanism

5.3 PSNR CALCULATION

Result After Checking PSNR of Compressed Image

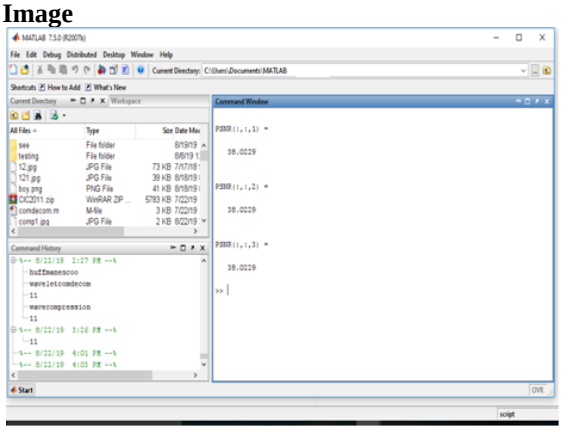

Fig 14 PSNR of compressed Image

INTERNATIONAL JOURNAL FOR RESEARCH PUBLICATION & SEMINAR
ISSN: 2278-6848 | Volume: 11 Issue: 01 | January - March 2020
Paper is available at http://www.jrps.in | Email : info@jrps.in

5.4 PSNR CALCULATION OF DECOMPRESSED IMAGE

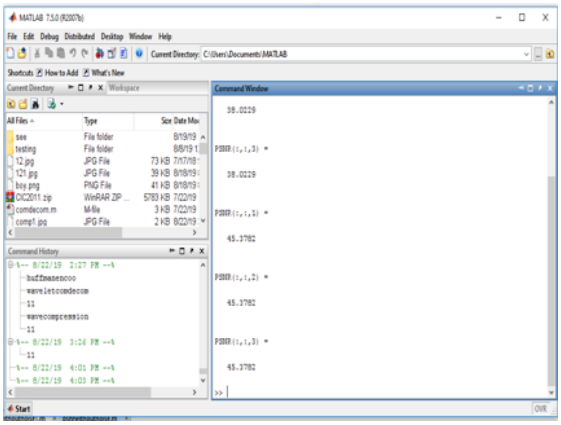

Fig 15 PSNR of Decompressed Image

5.5 MATRIX CHART TO COMPARE THE TRADITIONAL AND PROPOSED WORK

The following chart has represented the comparison between traditional wavelet based and Huffman based image compression with proposed algorithm considering file size after decompression as well as its PSNR value. Moreover, the compression time and decompression time in all cases have been discussed here.

Table:1 Matrix chart to compare the traditional and proposed work

	Original File	**WAVELET CODE**	**Huffman**	**PROPOSED ALGO**
Original file size (in KB)	38.2	38.2	38.2	38.2
File name (After compression)	121.jpg	compressed.jpg	comx.jpg	wdecompressed.jpg
File size in KB (compressed)	NA	6.68	1.85	1.12
File size in KB (Decompressed)	NA	12.6	12.6	11.7
Psnr 1	NA	inf	38.022	45.37
Compression ratio	NA	5.72	20.65	34.11
Compression time	NA	12.38	13.47	12.55
Decompression time	NA	121.45	123.39	123.29

[6] CONCLUSION

The produced result image has better quality as compared to traditional compression techniques. The wavelet based image compression has been integrated in order to increase the compression ratio in proposed work. The content has been compressed as dual layer. At first layer, the compression of content has been done using Huffman and at second layer, content has been compressed using wavelet mechanism. In same way, the contents have been decompressed by wavelet mechanism. Afterwards, it has been decompressed with the use of Huffman decompression. At final step, the decompressed image has been processed in order to increase its PSNR value to assure better quality. After all, It has been concluded that the proposed integration of Huffman and wavelet based integration is beneficial to secure the graphical content.

[7] FUTURE SCOPE

This research has focused on wavelet based graphical content compression that would be beneficial to increase compression ratio of graphical content. It would be beneficial to compress the content at two layers for double security. Proposed Mechanism may be updated and suitably designed in order to compress more than one images in a single compressed file for convenience of sending and receiving graphical content on a computer network. More layers may be added in mechanism of proposed layer to generate even better results of compressing graphical content but at the same time taking account of PSNR value. Audio and video content may also be compressed by applying suitable compressing mechanism at the compressing and decompressing layers of the proposed algorithm.

REFERENCE

1. Khan, Umhara & Mairaj, Sanna & Nazeer, Tamanna & Ahmed, Suhaib. (2017). Wavelet Based graphical content Compression Mechanisms: Comparative Analysis & Performance Evaluation. International Journal of Emerging Technologies in Engineering Research. 5. 9-13.
2. Nedhal Mohammad Al-Shereefi “Image Compression Using Wavelet Transform “ Babylon University/Collage of Science/Department of Physics,Journal of Babylon University/Pure & Applied Sciences/ No.(4)/ Vol.(21): 2013
3. Rachit Patel ,Virendra Kumar “A Fast & Improved graphical content Compression

mechanism U sing Huffman Coding "This fUll-text paper was peer-reviewed & accepted to be presented at IEEE WiSPNET 2016 conference.

4. Marcus J. Nadenau & Julien Reichel (1997) "Opponent Color, Human Vision & Wavelets for graphical content Compression"
5. Hidenori Sakanashi, Mehrdad Salami (1998) "Evolvable Hardware Chip for High Precision Printer graphical content Compression"
6. M. Klimesh, V. Stanton, & D. Watola (2001) "Hardware Implementation of a Lossless graphical content Compression Algorithm Using a Field Programmable Gate Array"
7. M Saenz, P Salama, K Shen (2001) "An Evaluation of Color Embedded Wavelet graphical content Compression Mechanisms"
8. William A. Pearlman(2002) "Trends of Tree-Based, Set-Partitioning Compression Mechanisms in Still & Moving graphical content Systems"
9. Anna Linderhed (2004) "Image Compression based on Empirical Mode Decomposition"
10. John Kominek(2006) "Algorithm for Fast Fractal graphical content Compression"
11. Matthew J. Zukoski (2006) "A novel approach to medical graphical content compression" Int. J. Bioinformatics Research & Applications, Vol. 2, No. 1, 2006
12. P. Raviraj & 2M.Y. Sanavullah(2007) "The Modified 2D-Haar Wavelet Transformation in graphical content Compression" Middle-East Journal of Scientific Research 2 (2): 73-78, 2007
13. Ahmed Nabil belbachir & Peter Michael(2010) "The Contour let Transform For graphical content Compression"
14. David Varodayan, Anne Aaron, & Bernd Girod (2010) "Exploiting Spatial Correlation in Pixel-Domain Distributed graphical content Compression"
15. G. K. Kharate, V. H. Patil (2010) "Color graphical content Compression Based On Wavelet Packet Best Tree" IJCSI International Journal of Computer Science Issues, Vol. 7, Issue 2, No 3, March 2010
16. Nidhi Sethi, Ram Krishna (2011), "Image Compression Using Haar Wavelet Transform", International Journal of Advanced Research in Computer Science, Volume 2, No. 4, July-August 2011
17. Anitha s(2011) " graphical content Compression Using Discrete Cosine Transform & Discrete Wavelet Transform" International Journal of Scientific & Engineering Research Volume 2, Issue 8, August-2011
18. Proch´azka, J. Pt´aˇcek, & I. (2012) "Wavelet Transform in Signal & graphical content Restoration"
19. M. Mozammel Hoque Chowdhury & Amina Khatun(2012) "Image Compression Using Discrete Wavelet Transform" International Journal of Computer Science Issues, Vol. 9, Issue 4, No 1, July 2012
20. P.Ashok Babu & Dr. K.V.S.V.R.Prasad (2012), "A Lossy Color graphical content Compression Using Integer Wavelet" Global Journal of Computer Science & Technology Graphics & Vision Volume 12 Issue 15 Versions 1.0 Year 2012
21. Rehna V. J & Jeya Kumar M. K (2012) "Wavelet Based graphical content Coding Schemes: A Recent Survey" International Journal on Soft Computing (IJSC) Vol.3, No.3, August 2012
22. Akshay Kekre (2013) "Image Compression Using Wavelet Transform & Differential Pulse Code Modulation Technique" International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 7, July – 2013
23. Miss. S.S. Tamboli1, Dr. V. R. Udupi (2013), "Image compression using haar Wavelet transform", International Journal of Advanced Research in Computer & Communication Engineering Vol. 2, Issue 8, August 2013
24. T.Karthikeyan, B.Praburaj, K.Kesavapandian (2014) "Wavelet Based graphical content Compression Algorithms – A Study" International Journal of Advanced Computer Research (ISSN (print): 2249-7277 ISSN (online): 2277-7970) Volume-4 Number-1 Issue-14 March-2014
25. Dr. Vineet Richariya, Mrs. Shweta Shrivastava, Naman Agrawal (2014), "Image Compression mechanism Using Different Wavelet Function", International Journal of Research in Computer & Communication Technology, Vol 3, Issue 5, May- 2014
26. Neha Pandey, Himani Agrawal (2014) wrote research paper on "Hybrid graphical content Compression Based on Fuzzy Logic Technology"

27. Preeti Banerjee "Designing & Implementation of Efficient Fuzzy Logic Based Fractal graphical content Compression mechanism within DCT Domain Using Quadtree Algorithm" International Journal of Advanced Research in Computer Science & Software Engineering Volume 2, Issue 8, 2014
28. Ali Tariq Bhatti, Dr. Jung Kim(2015) Implementation of Lossless Huffman Coding: graphical content compression using K-Means algorithm & comparison vs. Random numbers & Message
29. Malwinder Kaur A. (2015), "Litreature Survey On Lossless graphical content Compression", International Journal Of Advanced Research In Computer & Communication Engineering Vol. 4, Issue 3, March 2015
30. Er. Kiran Bala, Varinderjit Kaur (2016), "Advance digital graphical content compression using fast wavelet transforms comparative analysis with DWT", International Journal of Engineering Sciences & Research Technology Bala et al., 5(7): July, 2016
31. Anurag, Sonia Rani(2017) "JPEG Compression Using MATLAB" 2017 IJEDR | Volume 5, Issue 2
32. Dr. Vijaya Kumar C N, Kumar D(2017) " Performance Analysis of graphical content Compression Using Discrete Wavelet Transform" International Journal of Advanced Research in Computer Science & Software Engineering Volume 7, Issue 3, March 2017
33. Ali Tariq Bhatti, Dr. Jung Kim(2015), "Implementation of Lossless Huffman Coding: graphical content compression using K-Means algorithm & comparison vs. Random numbers & Message" International Research Journal of Engineering & Technology (IRJET) e-ISSN: 2395 -0056 Volume: 02 Issue: 05 | Aug-2015
34. Azariadis, P. (2001), "Computer graphics representation & transformation of geometric entities using dual unit vectors & line transformations", International Journal of Scientific & Research Publications, Volume 2, Issue 12, 2001
35. Banerjee, P.(2014) "Designing & Implementation of Efficient Fuzzy Logic Based Fractal graphical content Compression mechanism within DCT Domain Using Quadtree Algorithm",
36. Chen D. & Ramli R., "Preserving Brightness in Histogram Equalization Based Contrast Enhancement Mechanisms", Computer Journal of Digital Signal Processing, Vol. 14, No. 5, pp. 413-428, 2004.
37. Dash, T., & Nayak, T. (2012), "Non-Correlated Character Recognition using Artificial Neural Network", In Proceedings of National Conference on Dynamics & Prospects of Data Mining: Theory & Practices (pp. 79-83). India: OITS-BLS, 2012.
38. Deodhare, D., Suri, N. R., & Amit, R. (2005), "Preprocessing & graphical content Enhancement Algorithms for a Form-based Intelligent Character Recognition System", International Journal of Computer Science & Application, 2(2), 131-144, 2005.
39. Donchev, S.(2000) "Adaptive threshold-gradient method for segmentation of areas & objects of grey scale graphical contents" International Journal of Scientific & Research Publications, Volume 08, Issue 11, 2000
40. Dr. Muna F. & Dr. Nedhal Abdul Majied Al Saiyd(2005) "Medical Colored graphical content Enhancement Using Wavelet", Ubiquitous Computing & Communication Journal, Vol. 6, pp.1-8, November 2005.
41. Dhariwal,S. (2011) "Comparative Analysis of Various graphical content Enhancement Mechanisms", IJECT, Vol.2, Issue 3, pp. 91-95, September 2011.
42. Felzenszwalbs, P. F., & Huttenlocher, D. P. (2004), "Efficient Graph-Based graphical content Segmentation", International Journal of Computer Vision, 59(2), 167-181, 2004.
43. Kaur, K., & Sharma, M. (2013), "A Method for Binary graphical content Thinning using Gradient & Watershed Algorithm", International Journal of Advanced Research in Computer Science & Software Engineering, 3(1), 287-290, 2013.
44. Khan, K., Siddique, M., Aamir, M., & Khan, R. (2012), "An Efficient Method for Urdu Language Text Search in graphical content Based Urdu Text", International Journal of Computer Science Issues, 9(2), 523-527, 2012.
45. Kranthi, S., Pranathi, K., & Srisaila, A. (2011), "Automatic Number Plate Recognition" International Journal of Advancements in Technology, 2(3), 408-422, 2011.

46. Kumar, P.(2012), "Double Huffman Coding", International Journal of Advanced Research in Computer Science & Software Engineering Volume 2, Issue 8, August 2012
47. Kaur, M.(2015) A Literature Survey On Lossless graphical content Compression International Journal Of Advanced Research In Computer & Communication Engineering Vol. 4, Issue 3, March 2015
48. Kabir H., (2010), "Brightness Preserving graphical content Contrast Enhancement Using Weighted Mixture of Global & Local Transformation Functions", International Arab Journal of Information Technology, Vol. 7, No. 4, pp. 403-410, October 2010.
49. Kumar, V. & Bansal, H.(2011) "Performance Evaluation of Contrast Enhancement Mechanisms for Digital Graphical contents", IJECT Vol.2. Issue 1, pp. 23-27, March 2011.
50. Leszczyński, M.(2010), "Image preprocessing for illumination invariant face verification", International Journal of Advanced Research in Computer Science & Software Engineering, Vol. 5, Issue 6, pp. 283-288, 2010
51. Maini, R., & Aggarwal, H. (2009), "Study & Comparison of Various graphical content Edge Detection Mechanisms", International Journal of graphical content Processing, 3(1), 1-11, 2009.
52. Maini, R., & Aggarwal, H. (2010), "A Comprehensive Review of graphical content Enhancement Mechanisms", Jounal of Computing, 2(3), 8-13, 2010.
53. Maji, S., & Malik, J. (2009), "Object detection using a max-margin hough transform", IEEE Conference on Computer Vision & Pattern Recognition (pp. 1038-1045), 2009.
54. Mittal, A., & Dubey, S. K. (2013), "Analysis of MRI Graphical contents of Rheumatoid Arthritis through Morphological graphical content Processing Mechanisms", International Journal of Computer Science Issues, 10(2), 118-122, 2013.
55. Mythili, C.and V. Kavitha "Various types of noise within graphical contents especially within digital color image", International Journal of Advanced Research in Computer Science & Software Engineering Volume 2, Issue 8, 2011
56. Parker, J. R. (2010), "Algorithms for graphical content processing & computer vision", International Journal of Computer Applications, Vol. 140, No. 2, pp. 1-15, ISBN 0975-8887, 2010.
57. Pandey,N. & Agrawal, H.(2014) "Hybrid graphical content Compression Based On Fuzzy Logic Technology" Computer Journal of Digital Signal Processing, Vol. 14, No. 5, pp. 413-428, 2014
58. Pradeep, J., Srinivasan, E., & Himavathi, S. (2011), "Diagonal based feature extraction for handwritten alphabets recognition system using neural network", International Journal of Computer Science & Information Technology, 3(1), 27-38, 2011.
59. . Hai Lin-peng, Chen Chong "Research on Coordinate Transformation Method within Three-dimensional Reconstruction of Architecture" 2010
60. Samantaray, R. K., Panda, S., & Pradhan, D. (2011), "Application of Digital graphical content Processing & Analysis in Healthcare Based on Medical Palmistry", IJCA Special Issue on Intelligent Systems & Data Processing, 56-59, 2011.
61. Saxena A. ,H. (2014), "Three Dimensional Transformations In Computer Graphics", International Journal of Computer Science & Information Technology, 2014
62. Sharma, D. V., Saini, G., & Joshi, M. (2012), "Statistical Feature Extraction Methods for Isolated Handwritten Gurumukhi Script", International Journal of Engineering Research & Application, 2(4), 380-384, 2012.
63. Solomon, C., & Breckon, T. (2011), "Fundamentals of Digital graphical content Processing", A practical approach with examples in Matlab. John Wiley & Sons, 2011.
64. Saha,S., Chandrajit, p., Paul, P.(2014) "Brief experience on journey all over hardware developments for graphical content processing & it's applications on Cryptography" , International Journal of Enhanced Research in Science Technology & Engineering, Vol. 3, Issue 5, pp. 275-279, ISSN: 2319-7463, May 2014.
65. Singh, S., Bansal, R.K, Bansal, S.(2012) "Comparative Study & Implementation of graphical content Processing Mechanisms Using MATLAB" International Journal of Advanced Research in Computer Science & Software Engineering, Volume 2, Issue 3, March 2012
66. Sato,M.(2000) "Gradient magnitude based region growing algorithm for accurate

segmentation", International Journal of Scientific & Research Publications, Volume 5, Issue 12, 2000.

67. Shapi, A., Sulaiman, R.(2010) "Geometric Transformation mechanism for Total Hip Implant within Digital Medical Graphical contents" International Journal of Advanced Research in Computer Science & Software Engineering Volume 2, Issue 8, 2010
68. Sakuldee, R. & Udomhunsakul, S.(2007) "Objective Performance of Compressed graphical content Quality Assessments", International Journal of Electrical & Computer Engineering, vol. 2, no. 4, pp. 258-267, 2007.
69. Shapi'I A., Sulaiman R., Mohammad K. H. (2010), "Geometric Transformation mechanism for Total Hip Implant within Digital Medical Graphical contents", International Journal of Electrical & Computer Engineering, vol. 2, no. 4, pp. 258-267, 2010
70. Saha S., Pal C.,(2000), "Brief experience on journey all over hardware developments for graphical content processing & it's applications on Cryptography" International Journal of Advanced Research in Computer Science & Software Engineering Volume 5, Issue 8, 2000
71. WANG Zhiming, W. & TAO Jianhua(2006) "A Fast Implementation of Adaptive Histogram Equalization", International Conference on Signal Processing, ICSP, 2006.
72. Yanab, C.C.(2008) "Study on methods of noise reduction within a stripped image", International Journal of Advanced Research in Computer Science & Software Engineering, Vol. 5, Issue 6, pp. 283-288, 2008
73. Yeganeh H.(2008) "A Novel Approach for Contrast Enhancement Based on Histogram Equalization" International Conference on Computer & Communication Engineering, ICCCE, pp. 256 – 260, 13-15 May, 2008.
74. Yoon, H.(2009) "Image Contrast Enhancement based Sub-histogram Equalization mechanism without Over-equalization Noise", World Academy of Science, Engineering & Technology, Vol. 50, pp.176-182, 2009.
75. Alex Fukunaga & Andre Stechert(2008) "Evolving Nonlinear Predictive Models for Lossless graphical content Compression with Genetic Programming"
76. P.Ashok Babu & Dr. K.V.S.V.R.Prasad (2012), "A Lossy Color graphical content Compression Using Integer Wavelet" Global Journal of Computer Science & Technology Graphics & Vision Volume 12 Issue 15 Versions 1.0 Year 2012
77. Preeti Banerjee (2014) made research on "Designing & Implementation of Efficient Fuzzy Logic Based Fractal graphical content Compression mechanism within DCT Domain Using Quadtree Algorithm"
78. Malwinder Kaur(2015)A Literature Survey On Lossless graphical content Compression