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Image Enhancement Using diverse features

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Abstract: Images require substantial storage & resources now days, hence in this paper we are going to present the direct solution. We have developed the application which consist of features like image Compression, Image Cropping, Scaling & Encryption & Decryption. Image Compression is a technique of compressing an image while Image Scaling is a technique of resizing or reshaping image whereas Encryption is a technique of enhancing the security of a image or file by scrambling its contents. We have used JPEG standard algorithm for Compression technique, Interpolation technique for Scaling & Advance Encryption Standard used for Encryption/Decryption.

Keywords*:* Compression , Encryption , Decryption, Scaling.

I. INTRODUCTION

Image compression is method of data compression on digital images. Main objective of image compression is to reduce size of image, store efficiently on memory, and easily transfer on network because it consumes fewer amounts of data. We have one of the best algorithms JPEG. JPEG uses DWT to compress image. Advanced encryption standard is formal encryption method and it is acceptable worldwide. It can provide protection to files, data etc. AES allow to user protect their files with his own key or password. Image scaling is technique of resizing images or change resolution of images. Image interpolation can be grouped in two categories one is change resolution of image from higher to lower that is down scaling and second one is lower to higher call up scaling.

II. BASICS OF COMPRESSION

A. How JPEG-2000 compression works:

First step is to divide an image into blocks with each having dimensions of 8 x8.

Let us consider that image have following values.

$$\begin{bmatrix} 52 & 55 & 61 & 66 & 70 & 61 & 64 & 73 \\ 63 & 59 & 55 & 90 & 109 & 85 & 69 & 72 \\ 62 & 59 & 68 & 113 & 144 & 104 & 66 & 73 \\ 63 & 58 & 71 & 122 & 154 & 106 & 70 & 69 \\ 67 & 61 & 68 & 104 & 126 & 88 & 68 & 70 \\ 79 & 65 & 60 & 70 & 77 & 68 & 58 & 75 \\ 85 & 71 & 64 & 59 & 55 & 61 & 65 & 83 \\ 87 & 79 & 69 & 68 & 65 & 76 & 78 & 94 \end{bmatrix}$$

The range of the pixels intensities now are from 0 to 255.

We will change the range from -128 to 127.

Subtracting 128 from each pixel value yields pixel value from -128 to 127. After subtracting 128 from each of the pixel value , we got the following results.

$$\begin{bmatrix} -76 & -73 & -67 & -62 & -58 & -67 & -64 & -55 \\ -65 & -69 & -73 & -38 & -19 & -43 & -59 & -56 \\ -66 & -69 & -60 & -15 & 16 & -24 & -62 & -55 \\ -65 & -70 & -57 & -6 & 26 & -22 & -58 & -59 \\ -61 & -67 & -60 & -24 & -2 & -40 & -60 & -58 \\ -49 & -63 & -68 & -58 & -51 & -60 & -70 & -53 \\ -43 & -57 & -64 & -69 & -73 & -67 & -63 & -45 \\ -41 & -49 & -59 & -60 & -63 & -52 & -50 & -34 \end{bmatrix}$$

Now we will compute using this formula.

$$G_{u,v} = \alpha(u)\alpha(v)\sum_{x=0}^{7}\sum_{y=0}^{7} g_{x,y}\cos\left[\frac{\pi}{8}\left(x+\frac{1}{2}\right)u\right]\cos\left[\frac{\pi}{8}\left(y+\frac{1}{2}\right)v\right]$$

$$\alpha_p(n) = \begin{cases} \sqrt{\frac{1}{8}}, & \text{if } n = 0 \\ \sqrt{\frac{2}{8}}, & \text{otherwise} \end{cases}$$

The result comes from this is stored in let's say A(j, k) matrix.

There is a standard matrix that is used for computing JPEG compression, which is given by a matrix called as Luminance matrix.

This matrix is given below

$$Q_{j,k} = \begin{bmatrix} 16 & 11 & 10 & 16 & 24 & 40 & 51 & 61 \\ 12 & 12 & 14 & 19 & 26 & 58 & 60 & 55 \\ 14 & 13 & 16 & 24 & 40 & 57 & 69 & 56 \\ 14 & 17 & 22 & 29 & 51 & 87 & 80 & 62 \\ 18 & 22 & 37 & 56 & 68 & 109 & 103 & 77 \\ 24 & 35 & 55 & 64 & 81 & 104 & 113 & 92 \\ 49 & 64 & 78 & 87 & 103 & 121 & 120 & 101 \\ 72 & 92 & 95 & 98 & 112 & 100 & 103 & 99 \end{bmatrix}$$

We got this result after applying.

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$$B_{j,k} = \begin{bmatrix} -26 & -3 & -6 & 2 & 2 & -1 & 0 & 0 \\ 0 & -2 & -4 & 1 & 1 & 0 & 0 & 0 \\ -3 & 1 & 5 & -1 & -1 & 0 & 0 & 0 \\ -4 & 1 & 2 & -1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Now we will perform the real trick which is done in JPEG-2000 compression which is ZIG-ZAG movement.

The zig zag sequence for the above matrix is shown below. You have to perform zig zag until you find all zeroes ahead. Hence our image is now compressed.

$$B_{j,k} = \begin{bmatrix} -26 & -3 & -6 & 2 & 2 & -1 & 0 & 0 \\ 0 & -2 & -4 & 1 & 1 & 0 & 0 & 0 \\ -3 & 1 & 5 & -1 & -1 & 0 & 0 & 0 \\ -4 & 1 & 2 & -1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

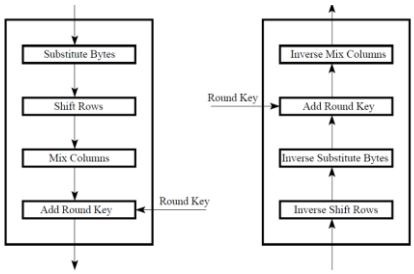
III. WORKING OF ENCRYPTION:

Step 1:

1. This step consists of using a 16*16 lookup table to find a replacement byte for a given byte in the input state array.
2. The entries in the lookup table are created by using the notions of multiplicative inverses in GF(2^8) and bit scrambling to destroy the bit-level correlations inside each byte.

Step 2:

Call **SHIFTROWS** for shifting the rows of the state array during the forward process. The corresponding transformation used during decryption is denoted as **INVSHIFTROWS** for inverse shift-row transformation.



Encryption round Decryption round

Step 3:

1. The shift rows step along with the mix-column step causes each bit of the cipher-text to depend on every bit of the plain text after 10 rounds of processing.
2. In DES, one bit of plaintext affected roughly 31 bits of cipher-text. But now we want each bit of the plaintext to affect every bit position of the cipher-text block of 128 bits.

Step 4:

Call **ADD ROUND KEY** for adding the round key to the output of the previous step during the forward process .The corresponding step during decryption is denoted **INVADDROUNDKEY** for inverse add round key transformation.

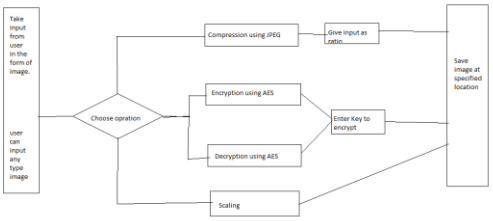
IV. BASICS OF SCALING

PROPOSED ALGORITHM:

The algorithm consists of basically four stages:

1. Reference image generation.
2. Intermediate image generation.
3. Linear interpolation.
4. High Boost filtering for Image enhancement.
5.

V. SYSTEM BLOCK DIAGRAM



VI. CONCLUSION

We conclude that the compression of image is done by JPEG standard where user can compress according to its requirement, however the compression ratio can be higher without block effect by using wavelet-based JPEG 2000 standard, further coming to Image Scaling & Cropping we have used Image Interpolation algorithm which are extensive used in medical imaging also it is an enhancement scheme which provides a high image quality (PSNR in dB) in comparison with Bilinear, BSpline and Lanczos interpolating methods however Encryption & Decryption using Advance Encryption standard shows successful implementation of text and images. The proposed methodology is applied for ensuring the personal privacy in the context of surveillance video camera systems. Only authorized users that possess the key. Key can decrypt the entire encrypted image sequence. The proposed method has the advantage of being suitable for mobile devices, which currently use the JPEG image compression algorithm, due to its lower computational requirements. The experiments have shown that we can achieve the desired level of encryption in selected areas of the image, while maintaining the full JPEG image compression compliance, under a minimal set of computational requirements.

REFERENCES

[1] R. C. Gonzalez and R. E. Woods, Digital Image Processing 2/E. Upper Saddle River, NJ: Prentice-Hall, 2002.
[2] G. K. Wallace, 'The JPEG Still Picture Compression Standard', Communications of the ACM, Vol. 34, Issue 4, pp.30-44.
[3] J. J. Ding and J. D. Huang, “Image Compression by Segmentation and Boundary Description,” June, 2008.
[4] George Wolberg Digital Image Warping. IEEE Computer Society Press, Los Alamitos, CA, USA, 1994.
[5] J.W. Hwang and H.S. Lee, “Adaptive Image Interpolation Based on Local Gradient Features,” IEEE Signal Processing Letters, vol.11, no.3,March 2004
[6] en.wikipedia.org/wiki/Advanced_Encryption_Standard.
[7] searchsecurity.techtarget.com/definition/Advanced-Encryption-Standard.
[8] www.webopedia.com.
[9] www.tutorials.com