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DESIGN OF MODIFIED DATA HIDING METHOD IN LOSSY JPEG IMAGE COMPRESSION

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Abstract: Data covering up is the specialty of concealing information for different purposes, for example, - to keep up private information, secure secret information. Understood system is the Steganography; Steganography has developed into an advanced technique of concealing a document in some type of sight and sound, for example, a picture, a sound record or even a video record. This paper displays another Steganography procedure, In this paper, we propose another high-limit reversible information concealing technique for JPEG-packed pictures. This technique depends on changing the quantization table and quantized discrete cosine change (DCT) coefficients. A few components of the quantization table are isolated by a whole number while the comparing quantized DCT coefficients are duplicated by a similar whole number and increased the value of make space for installing the information. By breaking down the impact of each single quantized DCT coefficient on the picture quality, an installing succession is picked keeping in mind the end goal to help control the expansion of document estimate in the wake of concealing the information in the mean time the PSNR esteem between the first uncompressed picture and stego JPEG picture is high. Trial comes about demonstrate that the proposed strategy accomplishes both high limit and high picture quality.

Keywords: DWT: Discrete Wave Transform, SVD: Singular Value Decomposition, PSNR: Peak Signal to Noise Ratio, MSE: Mean Square Error

I-INTRODUCTION

In the proposed conspire, a cover JPEG picture is first decoded to get the quantization table and quantized DCT coefficients, at that point a few sections of the quantization table are partitioned by a number and comparing quantized DCT coefficients are duplicated by a similar whole number and enhanced make space for installing the information. Subsequent to separating mystery bits from the stego picture, the first JPEG picture can be recouped in the meantime. The proposed calculation can be partitioned into two stages: the information concealing stage and the removing and reestablishing stage which are shown in the accompanying areas. To decrease the twisting caused by inserting and control the expansion of the record estimate, the choice of implanting positions ought to be talked about first.

The choice of installing positions For the reason for making the impact caused by information covering up as little as could be expected under the circumstances, the choice of implanting positions ought to be deliberately considered. As Huang et al. (2000) stated, conventional information concealing methods had a tendency to pick the mid-recurrence DCT coefficients in the DCT change area. Notwithstanding, while considering the quantization organize, things might be extraordinary. Along these lines, the prior methods may influence the scientists' decision on installing positions in the JPEG packed area. Xuan et al. (2007) did some basic exploratory examination to choose their ideal parameters. To test the impact of each and every quantized DCT coefficient on picture quality in considerably more detail, theoretic examination and trial examination are done in this paper. Here the pinnacle motion to-clamor proportion (PSNR) is received to assess the effect:

$$\mathrm{PSNR} = 10\log 10\left(\frac{255^2}{MSE}\right)$$

Where MSE (mean squared error) for an M×N grayscale image is defined as:

$$MSE = \frac{1}{MxN}\sum_{x=0}^{M-1}\sum_{y=0}^{N-1}\left(f^{'}(x,y) - f(x,y)\right)^2$$

Where f_(x, y) and f(x, y) are the pixel values of the distorted image and the original image respectively.

II-METHODOLOGY

Figure 1 below shows the proposed work flow diagram the overall procedure can be understand as by following steps:-

Step 1: input image acquisition can be any taken and image but proposed work use MATLAB standard images of lena, jet, Barbara, baboon and peppers.

Step 2: isolate the Red, Green and Blue frames as the image processing are suitable at 2D matrix only and all the reaming mathematics performed on Red, green, blue individually and at the last all this frame gets concatenate again.

Step 3: separate 8x8 block out of 2D frame as DCT is applicable only on 8x8 block.

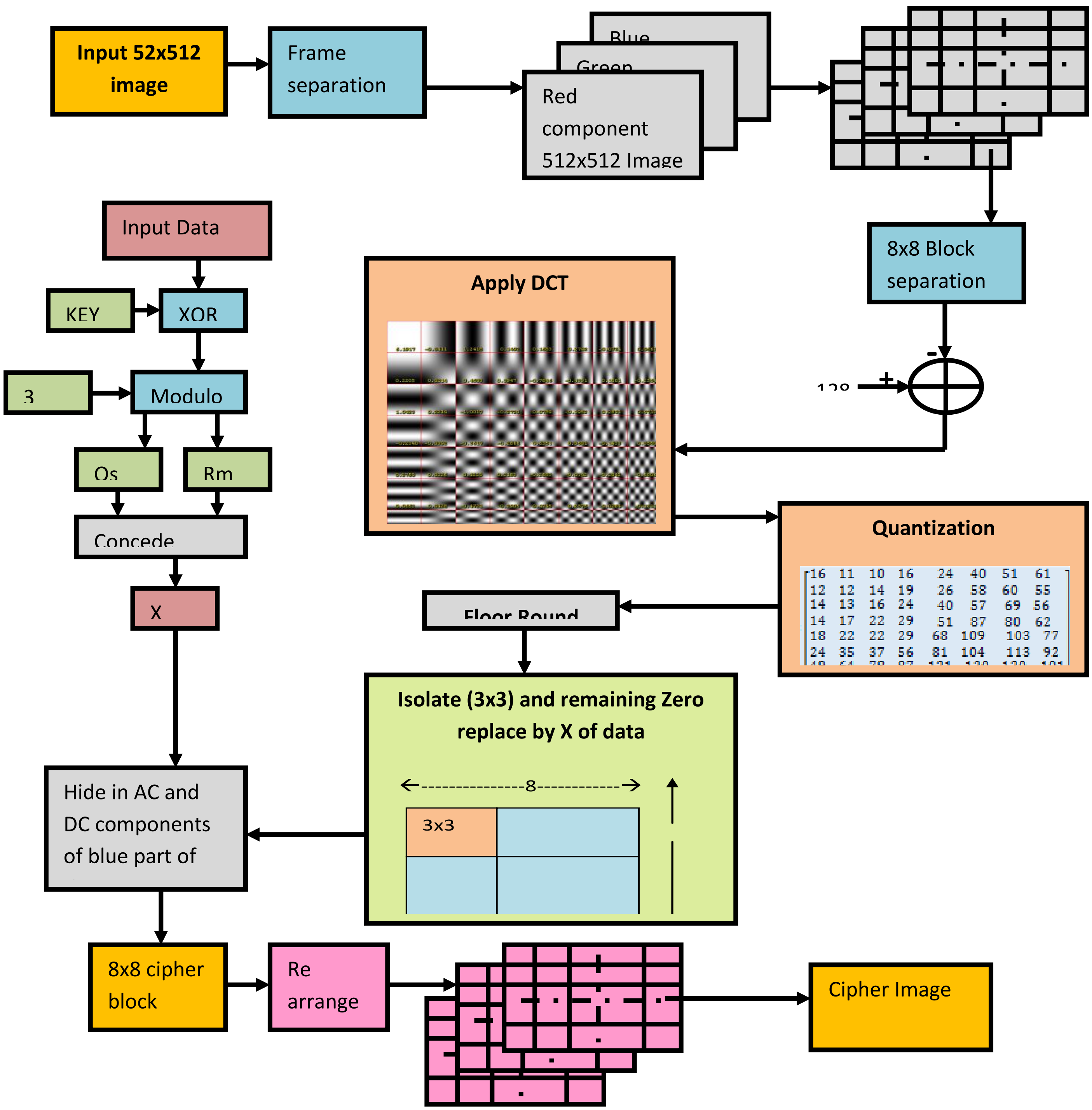

Figure 1 block diagram of proposed work.

Step 4: subtract the 8x8 block by 128 as cosine signals varies between -1 to 1, out frame block will vary between -128 to 128.
Step 5: apply DCT on the output block from step 4.
Step 6: perform Quantization by the quantization table provided by JPEG2 standard.
Step 7: round the output of quantization at its floor value.
Step 8: output 8x8 block will have few values in its 3x3 frame (9 pixels) rest of the 55 pixels will remains zero, the row zero elements are known as AC components and columns zero will be known as DC components.
Step 9: input the data and convert the data into ASCII.
Step 10: perform XOR between ASCII data and input KEY.
Step 11: compute modulo 3 operation on the data until each pixels gets convert into set of modulii
Step 12: concatenate the all modulo output
Step 13: hide the modulo components into AC and DC elements of the output frame from step 8.
Step 14: rearrange the 8x8 block and perform all step 4 to step8 operation into new 8x8 block
Step 15: concatenate red, green and blue frame.

III- ALGORITHM

Image.acquisition:.Let.an.image.is.x.(.i,.j,.k)
Where.'i'.is.the.row.number,.'j'.is.column.number,.'k'.is.frame.(k=1.for.red,.k=2.for.green.&.k=3.for.blue).and.x.is.the.intensity.of.pixel.at.(.i,.j,.k).
i=.1:.M
j=1:.N
k=1:.3
Hence.size.of.image.is.MxNx3

Sub-block.development:.
$c_k(\mathrm{p,q}) = \mathrm{x}(.\mathrm{m:m}+7, \mathrm{n.:n}+7, .1:3.)$
Where.m=.1.to.M.with.interval.of.8.as.m=1,.9,.17,…..M
Where.n=.1.to.N.with.interval.of.8.as.n=1,.9,.17,…..N
And.k=1,.2,.3,……….(MxN/64)
p=1,2,….8
q=1,2,….8

Subtraction.by.128
$d_k(p,q) = \{128 - c_k(p,q)\}$

Cosine.coefficient.matrix.and.image

$cos\theta$ (r,s)	$\begin{bmatrix} 6.1917 & -0.3411 & 1.2418 & 0.1492 & 0.1583 & 0.2742 & -0.0724 & 0.0561 \\ 0.2205 & 0.0214 & 0.4503 & 0.3947 & -0.7846 & -0.4391 & 0.1001 & -0.2554 \\ 1.0423 & 0.2214 & -1.0017 & -0.2720 & 0.0789 & -0.1952 & 0.2801 & 0.4713 \\ -0.2340 & -0.0392 & -0.2617 & -0.2866 & 0.6351 & 0.3501 & -0.1433 & 0.3550 \\ 0.2750 & 0.0226 & 0.1229 & 0.2183 & -0.2583 & -0.0742 & -0.2042 & -0.5906 \\ 0.0653 & 0.0428 & -0.4721 & -0.2905 & 0.4745 & 0.2875 & -0.0284 & -0.1311 \\ 0.3169 & 0.0541 & -0.1033 & -0.0225 & -0.0056 & 0.1017 & -0.1650 & -0.1500 \\ -0.2970 & -0.0627 & 0.1960 & 0.0644 & -0.1136 & -0.1031 & 0.1887 & 0.1444 \end{bmatrix}$	r = 1 2 3 4 5 6 7 8
	s=.1...2....3...4...5.....6.....7......8	

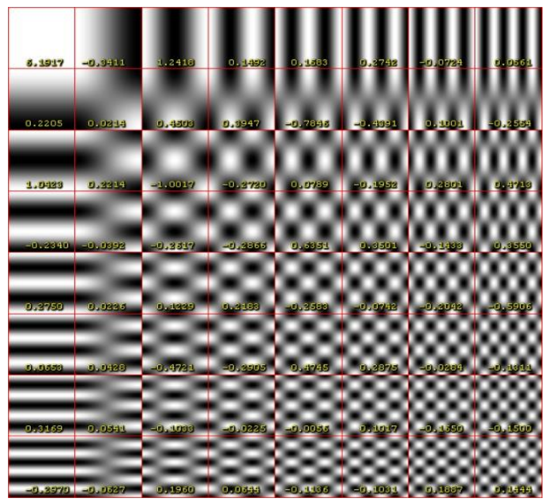

Figure.2.DCT.cosine.components
r=1,.2,….8...is.the.row.numb.er.of..cosine.coefficient.image
s=1,.2,….8...is.the.column.number.of..cosine.coefficient.image

Combination.of.each.part.of.cosine.coeffecient.images.to.get.sub.image..$\boldsymbol{d_k}$.
$A_{pq}(1,1) * cos\theta(1,1) = d_k(p,q)$
$A_{pq}(1,2) * cos\theta(1,2) = d_k(p,q)$
………………
…………
$A_{pq}(1,8) * cos\theta(1,8) = d_k(p,q)$
$A_{pq}(2,1) * cos\theta(2,1) = d_k(p,q)$
$A_{pq}(2,2) * cos\theta(2,2) = d_k(p,q)$

....

....

$A_{pq}(8,8) * cos\theta(8,8) = d_k(p,q)$

$$e_k(r,s) = \sum_{p=1}^{8}\sum_{q=1}^{8} A_{pq}(r,s)$$

Quantization.

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

Q_{rs}.given.above.is.the.JPEG.quantization.matrix.

$$f_k(r,s) = \frac{e_k(r,s)}{Q_{rs}}$$

$$g_k(r,s) = floor|f_k(r,s)|$$

$g_k(r,s)$.is.the.quantized.Image.sub-block

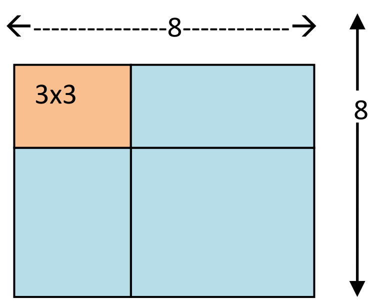

Figure.3:.3x3.separation.from.zero.value.AC.and.DC.components

Zig-Zag.Arrangement.

$$h_k(1,ct) = g_k(a,b)\ldots where.b = 1,2,\ldots.i.and.a = (i+1) - b..].for.i = 1,3,5,7$$

ct=ct+1;

$$h_k(1,ct) = g_k(a,b)\ldots where.a = 1,2,\ldots.i.and.b = (i+1) - a..].for.i = 2,4,6,8$$

ct=ct+1;

$$h_k(1,ct) = g_k(a,b)\ldots where.a = 8,7,\ldots.i.and.b = i,i+1\ldots.a..].for.i = 2,4,6,8$$

ct=ct+1;

$$h_k(1,ct) = g_k(a,b)\ldots where.b = 8,7,\ldots.i.and.a = i,i+1\ldots.b.].for.i = 3,5,7$$

ct=ct+1;

*.where.ct=r*s*

Apply.Run.length.Coding

Each.non.zero.encoded.as.triple

[(r,.s),c]

Where.r.number.of.zeros.before.current.value'

s.is.the.size.of.number.in.bits

c.is.the.actual.value

$$r_p = r_p + 1.when.(h_k(1,i).xor.h_k(1,i+1) = 0).else.p = p+1$$

$$s_p = count\{(s)_2\}$$

$$c_p = h_k(1,i)$$

$$for..i = 1,2\ldots.ct..$$

Now.can.be.consider.as.compressed.and.coded.data.stream.for.the.original.jpeg.image.sub-block.c_k*.(8x8)..is..[*$r_p,.s_p,c_p$*].and.*$g_k(t,u)$*.is.the.compressed.image.sub-block..where.t=1,2,3.and.u.=.1,2,3*

$c_k(8x8) \rightarrow. g_k(3x3)..$

Let.K.is.the.KEY.for.encryption,.then

$$l_k = g_k.xor.K$$

Let.D.is.the.data.which.needs.to.be.hide

$$D1 = (D)_2$$

As.l_k*.is.a.3x3.sub-image.hence.9.pixels*

$(y_k(1,1))_2.. = (l_k(1,1))_2.OR.(0000000\&D1(1,1)$

$(y_k(1,2))_2.. = (l_k(1,2))_2.OR.(0000000\&D1(1,2)$

$(y_k(1,3))_2.. = (l_k(1,3))_2.OR.(0000000\&D1(1,3)$

$(y_k(2,1))_2.. = (l_k(2,1))_2.OR.(0000000\&D1(1,4)$

$(y_k(2,2))_2.. = (l_k(2,2))_2.OR.(0000000\&D1(1,5)$

$(y_k(2,3))_2.. = (l_k(2,3))_2.OR.(0000000\&D1(1,6)$

$(y_k(3,1))_2.. = (l_k(3,1))_2.OR.(0000000\&D1(1,7)$

$(y_k(3,2))_2.. = (l_k(3,2))_2.OR.(0000000\&D1(1,8)$

$(y_k(3,3))_2.. = (l_k(3,3))_2.OR.(0000000\&D1(1,9)$

y_k *.will.have.the.data.hidden.at.its.LSB.and.which.will.be.not.effected.by.JPEG.compression*

IV-RESULT

Figure.4.below.shows.the.original.and.cipher.image.of.Lena.develop.using.proposed.work.

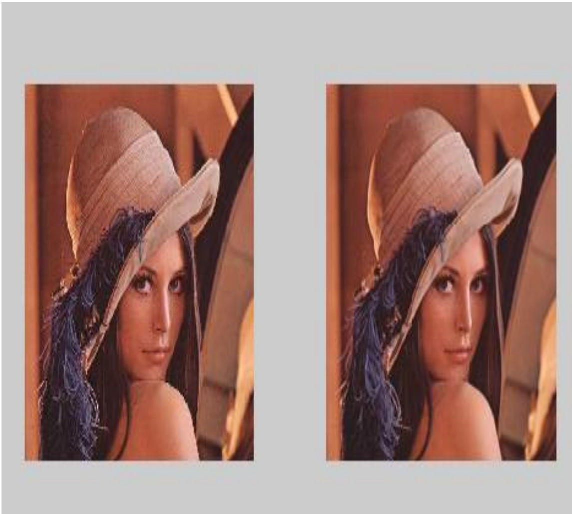

Figure.4.input.and.output.image

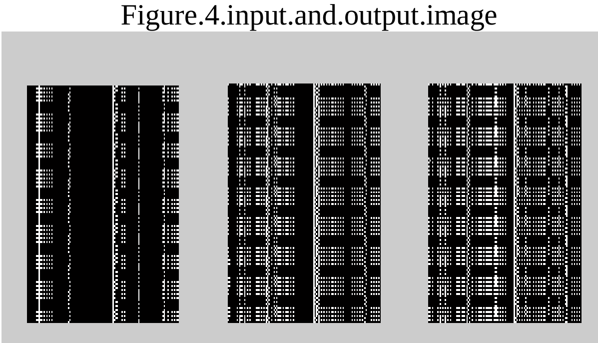

Figure.5.JPEG.pixels.after.run.length.coding

Figure.5.above.shows.the.binary.image.of.red.green.and.vlue.frame.after.run.length.coding.applied.on.the.lena.image..

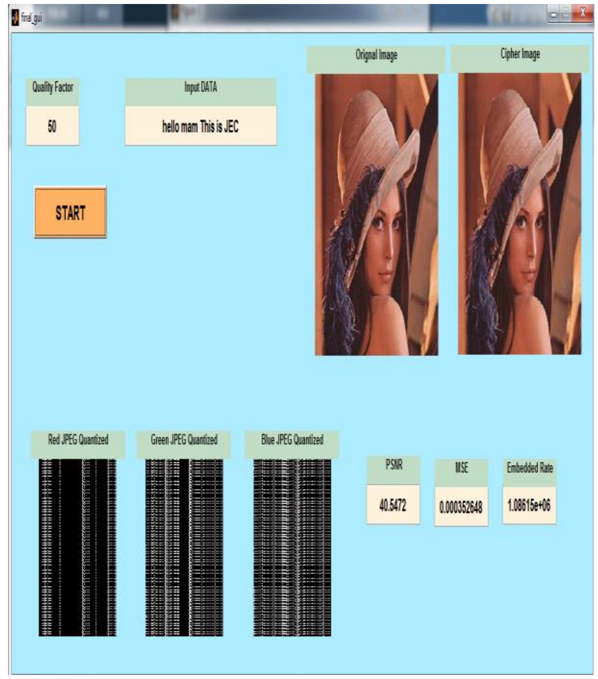

Figure.6:.Proposed.work.GUI

Figure.6.above.shoes.the.proposed.work.GUI.for.input.and.output.observation.and.parameter.input.and.output.observation.

QF=50			
	embedding.rate. *R*	*PSNR*	*MSE*
Lena	*10.67*	*40.54*	*0.0003526*
barbara	*10.07*	*40.89*	*0.000325*
Pepper	*11.22*	*39.1339*	*0.000488*
Jet	*10.67*	*41.27*	*0.000698*
Baboon	*10.06*	*41.68*	*0.000671*

Table.1:.Obtain.results.parameters

QF=50				
	Proposed.work		Xiaozhu.Xie.et.al.[1]	
	embedding.rate.*R*	*PSNR*	embedding.rate.*R*	*PSNR*
Lena	*10.67*	*40.54*	*6.43*	*38.09*

barbara	*10.07*	*40.89*	*5.44*	*35.76*
Pepper	*11.22*	*39.13*	*6.38*	*37.22*
Jet	*10.67*	*41.27*	*6.35*	*38.34*
Baboon	*10.06*	*41.68*	*4.42*	*32.87*
Average	*10.53*	*40.90*	*5.80*	*36.46*

Table.2.Comparative.results

Table.1.above.shows.the.obtain.results.for.the.MATLAB.standard.image.of.lena,.baboon,.Barbara,.Jet.and.papper,.all.input.images.of.512x512.size.and.the.data.hidden.is.of.1.Kb...
Table.2.above.shows.the.comparative.results.between.Xiaozhu.Xie.et.al.[1].work.and.proposed.work.it.can.be.observe.that.proposed.work.PSNR.is.higher.then.[1].work,.also.the.data.embedding.rate.is.high.

V-CONCLUSION

In.this.paper,.a.high.capacity.reversible.JPEG-to-JPEG.data.hiding.scheme.is.proposed..Through.lowering.certain.quantization.table.entries.and.lifting.corresponding.quantized.DCT.coefficients,.space.is.made.for.embedding.data..Using.the.proposed.embedding.strategy,.our.scheme.can.achieve.high.embedding.capacity.and.keep.the.distortion.introduced.by.embedding.very.low,.meanwhile.the.original.cover.JPEG.image.can.be.restored.after.the.secret.data.are.extracted..Experiments.results.demonstrate.that.the.proposed.scheme.maintains.the.image.quality.of.a.stego.JPEG.image.when.the.embedding.capacity.is.high..Besides,.the.file.size.after.embedding.with.not.too.huge.data.is.acceptable..Compared.with.Chang.et.al.'s.method.and.Xuan.et.al.'s.method,.the.proposed.method.is.superior.in.terms.of.the.image.quality,.hiding.capacity.and.file.size..The.proposed.scheme.is.very.practical.for.image.files.stored.and.transmitted.in.the.JPEG.format

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