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Development of Secure Image Transposal Algorithm Using 16 *16 Quantization Table

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Abstract – **Computerized picture scrambling can make an picture into a totally diverse good for nothing picture amid modification,and it is a preprocessing amid stowing away data of the computerized picture, which too known as data camouflage.Picture scrambling innovation depends on data cover up innovation which permits non-password protection computation for data cover up.Data stowing away innovation driven to a insurgency in the fighting of organize data,since it brought a arrangement of unemployed combat computations,and a part of nations pay a part of considerations on this zone. Organize data fighting is an imperative portion of data fighting, and its center thought is to utilize open organize for private data transference.The picture after scrambling encryption computations is chaotic,so aggressor cannot disentangle it.A few made strides advanced tidemarking innovation can apply scrambling method to alter the dispersion of the mistake snippet in the picture to move forward the strength of computerized tidemarking innovation.Arnold scrambling computation has the highlight of effortlessness and periodicity, so it is utilized broadly in the computerized tidemarking technology.**

Keywords: Color transformation, data hiding, image encryption, mosaic image, secure image transmission.

I. INTRODUCTION AND RELATED WORK

In the first place montage means the art endeavor created by contriving tiny pieces of some rebases like sandstone, tumbler, etc. employed in an primeval occasion but resultantly it still employed in various operations in our day. Additionally montage[3,10,15] picture is an image not only shaped by put in order to various penile images but also combining these pantiles to mode a animated better image i.e. reflection. Similarly through design a montage employs artificial pictures i.e descriptions intended for the pantile photos to reconstruct an another individual of the images. Indeed, slighter metaphors will prevail closed the larger image. At this instant oldest era the sculpture of montage has been expansively employ to beautify community as well as cover up spaces. At the present time to time it is still possible to discover up few of these creative endeavors as well. Henceforth it is invented in oldest time, they are still employed in various operations in present time. Montage depiction on can able produced larger specific image from combining the small pantiles [1,2,7].

In the light of a new technique of montage image called cover up-morsel-visible mortage image[1],contains small little parts of the given input image i.e. depiction on or ovali mode shape tiles that is utilized in current contemplated think about. By watching such sort of montage image i.e. depiction on we found in our consider, one is capable to observe every single one the parts of rebasis image i.e. depiction ,on the contrary the parts or tiles is so little in estimate and it is called are arbitrary in a location that any spectator cannot figure out the genuine group of pantiles or is not able to anticipate how the genuine image i.e. depiction on looks like.. Subsequently, the basis image i.e. depiction on is said to be furtively implanted in the coming about montage image i.e. depiction , in spite of the fact that the part pieces are unmistakable to eyewitness and furthermore it is the essential cause why coming about montage image i.e. depiction on is called cover up-morsel-visible, this is the fundamental distinctiveness of modern montage image[16,18,21].It can be utilized as a carrier of the mystery basis image i.e. depiction on to camouflage with an alternative-the end image i.e. depiction on of a distinctive substance equally important the unemployed procedure is executed here for the utilized in data stowing away. It is exceptionally valuable intended for the relevance of undercover up communication or safe keeping of mystery image i.e. depiction on [22,24,27].

II.IDEAS OF THE PROPOSED ALGORITHM

The Proposed method includes two main phases as shown by the flow diagram of Fig.1. Mosaic image creation and 2. Secret image recovery.

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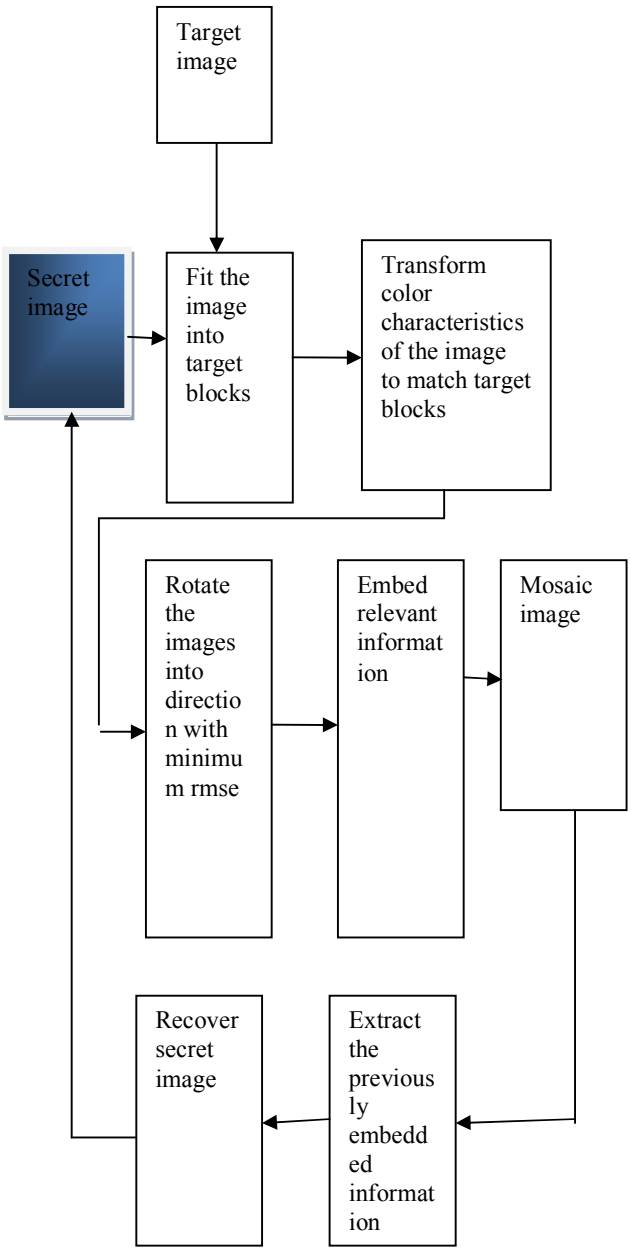

Fig. 1 Mosaic image creation.

1. Algorithm of the Proposed Method

Based on the above discussions the detailed algorithms for mosaic image creation and implanting on other images and also purposes are defined below respectively algorithm 1 and algorithm 2

A1lgorithm 1 Implanting Algorithm

Here the algorithm to embed clandestine picture in the cover up Picture is described as below:

STEP-1: Input the cover up picture and clandestine picture

STEP-2: Find out cover up picture volume and inferingly decide maximum communication volume that can be encapsulated based on section volume.

STEP-3: Permode Arnold transmode for iteration 10 times to get the scrambled clandestine picture

STEP-4: Create a vector from the clandestine picture by reshaping.

STEP-5: Check whether the clandestine picture isn't bigger than cover up picture.

STEP-6: Create the maximum sized communication by padding ones to the end of clandestine picture.

STEP-7: Divide the cover up picture in sections

STEP-8: Permode DCT closed cover up picture section.

STEP-9: If clandestine communication snippet is 0, check (4, 1) < (5, 0), if True then swaps them

STEP-10: If communication snippet is 1, check (4, 1) > = (5, 0) if True then swap them

STEP-11: Transmode section back into spatial domain

STEP-12: Write the output stego picture in a file.

B. Extraction Algorithm

Here the algorithm to extract clandestine communication from the stego Picture is described as below:

STEP-1: Input the stego picture and original cover up picture

STEP-2: Find out stego picture volume and original cover up picture volume

STEP 3: Set the section volume for cover up picture

STEP-4: Confide in on cover up picture size and section size decide maximum clandestine communication volume

STEP-5: Divide cover up picture and stego picture in sections

STEP-6: Permode DCT closed cover up picture section and stego picture section

STEP-7: If cover up_dct_section (5,0) > stego_dct_section (4,1) then set communication snippet as 0, else 1

STEP-8: Repeat STEP-7 for entire communication snippets.

STEP-9: Reshape the recover uped communication

STEP-10: Performed Arnold Transmode for iteration 10 times closed the recover uped communication.

STEP-11: Display rerecorded communication picture.

2 Purpose Algorithm

A. To propose a unemployed computation for relaying the mystery picture closed a network by combining the morse alphabet clandestine writing & tide marking procedure.

B. To execute the closed computation on a variety of picture arrange like (jpeg, png, tiff, bmp) & broadcast organize like (mpeg, avi, flv).

C. To assess the execution of contemplated algo and premise of criterion like PSNR, MSE.

D. To perform the relationship of above algorithm (A protected picture based clandestine writing, morse alphabet and tide marking with protected key) with the obtainable computation (Investigation of protected video clandestine writing utilizing computer forensics procedure

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for improve statistics protected) depends on criterion like PSNR, MSE.
A.Endeavor is derivative for two algo encryption sidewise. B. Unscrambling side. Employing encryption computation to the facts which we need to cover up and at that point on the getting side we concern unscrambling computation for de-confidential the facts which is cover up in picture or video[1,44]. So we unite both unscrambling and encryption algo and contrast it with the accessible algo will appear superior comes about for PSNR, MSE and implanting magnitude after clamor invasions. Algo is initially stacking the color RGB picture then past RGB picture is modification closed in YCbCr. We connected stage to stage DWT methods to picture afterward we chosen Y band to implant tidemark and connected lower to lower, lower to higher and higher to higher and higher to lower band to the tide marked picture. Then added clandestine rub utilizing slightest critical snippet (LSB) algorithm proceeding advance we included mystery key [8].We do on the encryption sidewise. Then on unscrambling side we execute inverse wavelet modification. We will translate YcbCr picture (it was produced in encryption side) to RGB color picture. At that point we will discover up the end consequences which are constancy degree (PSNR) amid original and tide marked picture and at that point we extract tidemark and mystery communication and will show PSNR standard values and chart amid 4L and 5L DWT too the charts of implanting magnitude and PSNR after clamor assault and its standard values as correlated to past end consequences [12,44].

A. Algorithm 3 **Encryption Algorithm**

Step 1: Stack unique color picture (RGB).
Step 2: Modification closed RGB to YCbCr.
Step 3: Concern 4L and 5L wavelet transmode.
Step 4: Decide on Y band to insert the tidemark.
Include to LL, HL, LH and HH separately.
Include to (HL + LH) together.
Include to (HL + LH) and some recurrences of HH.
Step 5: Reserved the location of the unique picture afflicted by the tidemark.
Step 6: Include mystery communication utilizing LSB procedure.
Step 7: Include mystery key. B. De-confidential Algorithm
Step 8: Apply reverse wavelet transmode.
Step 9: Modification closed YCbCr to RGB.
Step 10: Discover up constancy degree (PSNR) amid original and tidemarked picture. Step 11: Extricate tidemark and mystery communication.
Step 12: Show PSNR standard values and chart amid 4L and 5L DWT, moreover inserting magnitude graph and its standard values and PSNR after clamor assault.
Step 13: leave from all steps.

*B. 1.1.3 Block Diagram of **Algorithm 4***

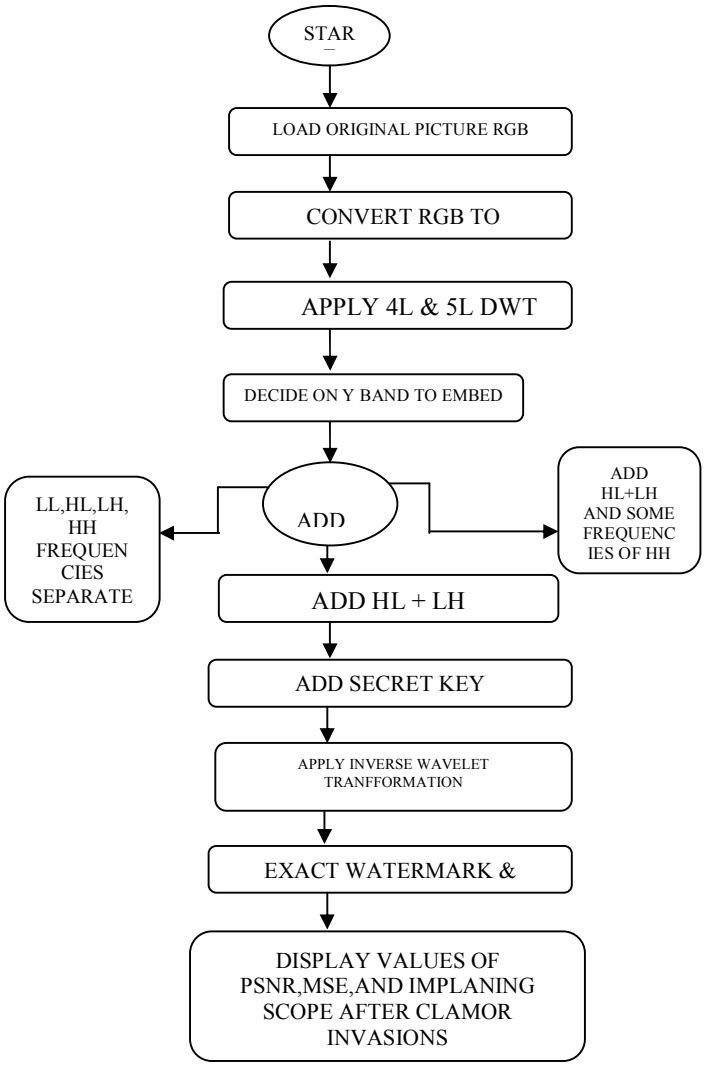

Fig. 2 Outflow chart depiction of contemplated endeavor.

3. Algorithm 4 Conventional Algorithm

Step 1: Stack unique color picture (RGB).
Step 2: Modification closed RGB to YCbCr.
Step 3: Concern 4L wavelet transmode.
Step 4: Choose Y band to insert the tidemark.
Include to LL, HL, LH and HH separately.
Include to (HL + LH) together.
Include to (HL + LH) and some recurrences of HH
Step 5: Reserved the location of the unique picture influenced by the tidemark.
Step 6: Concern reverse wavelet transmode.
Step 7: Modification closed YCbCr to RGB.
Step 8: Discover up constancy degree (PSNR) amid original and tidemarked picture.

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Step 9: Extricate tidemark.
Step 10: Show PSNR standard values and chart amid 4L DWT.
Step 11: Departed from Steps.

Our contemplated endeavor on criterion like PSNR, MSE and implanting magnitude. This fundamental thought is to assess a only numeral that will appear the worth of recreated picture. Remade picture can be judged superior with higher measurements [6]. More closed the traditional SNR actions are not assumed to evaluate person personal recognitions [44,56].

[7]. Here we will utilize flag to clamor proportions since of their easy computation, as we accept that continuously advanced procedures do not cruel superior worth [3]. To begin with we will calculate cruel square mistake (MSE) of recreate picture as takes after

$$\mathrm{MSE} = \frac{\sum[\mathrm{f(i,j)} - F(i,j)]^2}{N^2}$$

In altered way to calculate PSNR we will first calculate MSE as per subsequent mathematical statement

$$\mathrm{MSE} = \frac{\sum_{M,N}[I_1(m,n) - I_2(m,n)]^2}{M * N}$$

In this condition, M and N are the numeral of rows and columns in the input pictures, respectively. Then the square calculates the PSNR utilizing the subsequent condition:

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

PSNR in decibels (dB) is calculated by using

$$\mathrm{PSNR} = 20\log_{10}\left(\frac{255}{\mathrm{RMSE}}\right)$$

More particularly, primarily the cover up image divided into the numeral of pantiles or rectangular-shaped sections, which are rooted after that into the end image chosen from the database to create the montage image , as well as the numeral of cover up pictures for this function is boundless by the volume of the clandestine image i.e. depiction .This is not the casing of long-established montage image i.e. depiction on moderation where the available pantile images are boundless in numeral for essential employ comply the pantile images are not spawn from the clandestine image i.e. depiction on and possibly employed closed and closed. Then the associated figures of pantile-image fitting is rooted in a few sections of the montage image i.e. depiction , which are designated arbitrarily by the clandestine solution. Resultantly, an onlooker processed the key which reconstructs the clandestine image by retrieving the rooted data, even as any cyberpunk devoid of this key cannot[1].”Non-photorealistic depiction ”(NPR) is a winning region of endeavor station graphics(CG) and it currently applies near numerous significant i.e. contexts together with scientific revelation, in order to find data revelation or imaginative style simulation. Non-photorealistic rendering’s grail might be present measured complementary to the conventional major purpose of the central processing unit graphics whichever is to mold plus identically deliver 3D scenes inside a expected like photo realistic) mode. Patch endeavor, in substance, are imagery as procured connecting together tiny colored wreckage. probably, they are the old fashioned examples of distinct primeval depended on descriptions. In the artificial domain, patch endeavor (montage) are example, it composed of a collection of tiny images called pantiles’. More closed the pantiles tessellate a input image with the aim of reconstructing unique illustration data provided into a new montage similar to approach as well. The craftsmanship of antiquated montage majorly composing all the small colored montage or maybe than unmade or irregular conveyance of strips ordered employ of pictures highlights. Equally introduced in shape of form and measure would be more instructive. So, the strips were organized in ovate since it’s potential was in straight up or constant orientation. Such a design would not permit eye witness in the direction of observe the entirety picture.To dodge alike hold up, they put strips in aforesaid way that it completed another accentuation on the edgings of the critical data to be shown in the below picture. In building a computerized montage picture, we are not worried approximately the materials utilized to lay the montage plan other than in the method the strips of the picture are speculate Orchestrating the strips in diverse customs would allow diverse montage pictures. To depiction the how the montage, observe the expression utilized was ‘opus’ and dissimilar procedure executed are ‘opus musivum’ and ‘opus vermiculatum’.

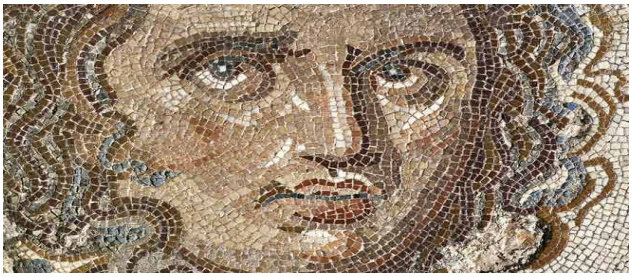

Fig. 3 a. Opusmusivum b. Opus Vermiculatum

In above figure Altered montage procedure (a) Opus musivum (b) Opus vermiculatum. Hausner

Begins with individual to make an exertion to make a practical montage pictures. He made this conceivable by utilizing a blend of diverse methods, procedure, procedures, methods quality centroid a Vornoi graphs and alternative methods equally edging highlights ,manhattan distance.

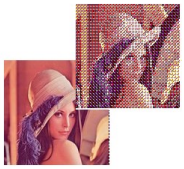

Fig.1.2 a. Original Image b.Hausner

c. Di Bilasi **d. Schlechtweg**

Fig 4 Montage procedure (a) novel image (b) Hausner(c) Di Blasi and Gallo (d) Schlechtweg et al

III.IDEAS OF MOSAIC IMAGE GENERATION

Problem encountered in generating mosaic image are discussed in this section with solutions to them proposed .

1. COLOR TRANSFORMATION BETWEEN BLOCKS

In the first phase of the proposed method each tile image T in the given secret image is fit into a target block B in a preselected target image. Since the color characteristics of T and B are different from each other, how to change their color distributions to make them , look alike is the main issue here. Here it is proposed a color transfer scheme in this aspects, which converts the color characterstics of an image to be that of another in the 1alpha beta color space. this idea is an answer to the issue and is adopted in this thesis, except that the RGB color space instead of the 1alpha beta one is used to reduce the volume of the required information for recovery of the original secret image.

More specifically let T an d B be described as two pixel sets{p1,p2,p3,…….pn}and{p1',p2',p3'……pn')respect ively let the color of each pi be denoted by {ri,bi,gi} and that of each pi' by {ri',bi',gi'}. At first we compute the means and standard deviations of T and B, respectively in each of the three color channels R G B by the following formulas;

$$\mu c = 1/n \sum_{i=1}^{n} ci, \ldots \text{-.--.(1)}$$

$$\mu c' = 1/n \sum_{i=1}^{n} ci', \text{--}\ldots\ldots\ldots

In transforming the color characteristics of a tile image T to be that of a corresponding target block B as described above, how to choose an appropriate B for each T is an issue. For this ,we use the standard deviation of the color in the block as a measure to select the most similar B for each T. Specially we sort al lthe tile images to form a sequences Stile,and all the target blocks to form another , S_{target} according to the average values of the standard deviation of the three color chanells. Then we fit the first in stile into the first in S_{target} fir the second in Stile into the second in Starget and so on. additionally after a target block B is chosen to fit a tile image T and after the color characteristics of T is transformed we conduct a further improvements on the color similarity between the resulting tile image T' and the target block B by rotating T' into one of the four directions 0degree,90 degree, 180 degree,270 degree. which yields a rotated version of T' with the minimum root mean square error (RMSE) value with respect to B among the four directions for final use to fit T into B.

C. handling overflow /underflow in color transformation

After the color transformation process is conucted as described previously some pixel values in the new tile image T' might have overflows or underflows. To deal with this problem, we convert such values to be non overflow or non underflow ones and record the value differences as residuals for use in later recovery. specifically we convert all the transformed pixels values in T'' not smaller than 255 to 255. And all those not larger than 0 to be 0.next we compute the difference between the original pixel values and the converted ones as the residuals and record then as part of the information associated with T'. According the pixel values ,which are just on the bound of 255 or 0.however can not be distinguished from those with overflow/underflow values during later recovery since all the pixel values with overflow/underflows are converted to be 255 or 0 now. to remedy this we define the residuals of those pixel values which ar eon the bound to be 0 and recovered them as well.

however as can be seen from (5) the ranges of possible residual values are unknown and this causes a problem of deciding how many bits should be used to record a residual. to solve this problem we record the residuals values in the untransformed color space rather than in the transformed one that is by using the following two formulas we compute first the smallest possible color values Cs with c=r ,g,b in T that become larger that 255,as well as the largest possible value Cl in T that becomes smaller than 0 ,respectively after the color transformation process has been conducted

Cs = [1/q (255- μ'c)+ μ'c]---……..…..(7)

Cs = [1/q c(0- μ'c)+ μc]----…..(8)

Next for an untransformed value ci which yields an over flow after the color transformations, we compute its residual as [ci-cs] and for ci which yields an underflow we compute its residual as [cl-ci].then the possible values of the residuals of ci will all lie in the range of 0 to 255 as we can be verified bits and finally because the residual values are centralized around zero we use further in this study the Huffman coding scheme to encode the residuals in order to reduce the number of required bits to represent them.

D .Embedding information for secret image recovery

In order to recover the secret image from the mosaic image we have to embed relevant recovery information into the mosaic image for this we adopt a technique proposed and apply ot to be least significant bits of the pixel in the created mosaic image to conduct data embedding. unlike the classical LSB replacement methods which substitute LSBs with messages bits directly the reversible contrast mapping method applies simple integer transformation to pairs of pixel values specifically the method conducts forward and backward integer transformations are follows respectively in which (x,y) are a pair of pixel values and (x',y')are the transformed ones.

X' = 2x-y, y' = 2y-x ----------……..--……(9)

X= [2/3 x'+1/3 y'] , y = [1/3x+2/3y']-…… ---------….(10)

The method yields high data embedding capacities close to the highest bit rates and has the lowest complexity reported so far.

The information required to recover a tile image T which is mapped to a target block B includes 1. The index of B

2. the optimal rota1tion angle of T

3. the truncated means of T and B and the standard deviation quotients of all color channels and 4. He overflow/underflow residuals. these data items for recovering a tile image T are integrated as a five component bit stream of the form

M= t1t2……tm r1r2m1m2…m48q1q2……..q21d1d2….dk

In which the bits segments T1t2…..tm, r1r2m1m2-….m48,q1q2…….q21,and d1d2……dk represents the values of the index of B the rotation angle of T the means of T and B the standard deviation quotients and the residuals respectively.

In more detail the number of required bits for the five data items in M are discussed below 1. The index of B needs m bits to represent with m computed by

M= [log[(Ws * Hs)/NT]

In which Ws and Hs are respectively the width and height of the secret image S and NT is the size of the target image T,(2).it needs two bits to represent the rotation angle of T because there are four possible rotation directions

3) 48 bits are required to represent the emans of T and B because we use eight bits to represent a mean value in each color channel

4. it needs 21 bitsa to represents the quotients of T over B in the three color channels with each channel requiring 7 bitsand

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5)the total number k of required bits for representing all the residuals depends on the number of overflows or underflows in T'.
Then the above defined bit stream of all the tile images are concatenated in order further into a total bit stream Mt for the entire secret image moreover in order to protect Mt from begin attacked. We encrypt it with a secret key to obtain an encrypted bit stream M't. which is finally embedded into the pixel pairs in the mosaic image using the method described above. It may require more than one iteration in the encoding process since the length of M't may be larger than the number of pixels available in an iteration. A plot of the statics of the number of the numbers of required bits for secret image recovery is shown in experimental result graphs. Moreover we have to embed as well some related information about the mosaic image generation process into the mosaic image for use in the secret image recovery process. Such information described as a bit stream like M mentioned previously includes the following data items
1. the number of iterations conducted in he process for embedding the bit stream M't.
2. the total number of used pixels in the last iteration for embedding M't'
3. huffamatable for encoding the residuals.
With the stream M't embedded into the mosaic images we can recover the secret image back as will be described later. It is noted that some loss will be incurred in the recovered secret image or more specifically in the color transformation process using 3. Where each pixel's color value ci is multiplied by the standard deviation quotients qc and the resulting real values ci'' is truncated to be an integer in the range of 0 through 255. However because each truncated part is amller than the value of 1.the recovered value of ci using (5) is still precise enough to yield a color nearly identical to its original one. Even when overflows/underflows occur at some pixels in the color transformations process we record their residual values as described preciously and after using (5) to recover the pixel value ci, we add the residual values back to the computed pixel values ci to get the original pixel data, yielding a nearly losslessly recovered secret image according to the results of the experiments conducted in this thesis each recovered secret image has a very small RMSE value with respect to the original secret image as will be shown later in experimental section.

IV METHODOLOIES

Based on the above discussions the detailed algorithms for mosaic image creation and implanting on other images and also purposes are defined below respectively algorithm 1 and algorithm 2

A1lgorithm 1 Implanting Algorithm
Here the algorithm to embed clandestine picture in the cover up Picture is described as below:
STEP-1: Input the cover up picture and clandestine picture
STEP-2: Find out cover up picture volume and inferingly decide maximum communication volume that can be encapsulated based on section volume.
STEP-3: Permode Arnold transmode for iteration 10 times to get the scrambled clandestine picture
STEP-4: Create a vector from the clandestine picture by reshaping.
STEP-5: Check whether the clandestine picture isn't bigger than cover up picture.
STEP-6: Create the maximum sized communication by padding ones to the end of clandestine picture.
STEP-7: Divide the cover up picture in sections
STEP-8: Permode DCT closed cover up picture section.
STEP-9: If clandestine communication snippet is 0, check (4, 1) < (5, 0), if True then swaps them
STEP-10: If communication snippet is 1, check (4, 1) > = (5, 0) if True then swap them
STEP-11: Transmode section back into spatial domain
STEP-12: Write the output stego picture in a file.
B. Extraction Algorithm
Here the algorithm to extract clandestine communication from the stego Picture is described as below:
STEP-1: Input the stego picture and original cover up picture
STEP-2: Find out stego picture volume and original cover up picture volume
STEP 3: Set the section volume for cover up picture
STEP-4: Confide in on cover up picture size and section size decide maximum clandestine communication volume
STEP-5: Divide cover up picture and stego picture in sections
STEP-6: Permode DCT closed cover up picture section and stego picture section
STEP-7: If cover up_dct_section (5,0) > stego_dct_section (4,1) then set communication snippet as 0, else 1
STEP-8: Repeat STEP-7 for entire communication snippets.
STEP-9: Reshape the recover uped communication
STEP-10: Performed Arnold Transmode for iteration 10 times closed the recover uped communication.
STEP-11: Display reserved communication picture.

Algorithm 2 PURPOSES

A. To propose a unemployed computation for relaying the mystery picture closed a network by combining the morse alphabet clandestine writing & tidemarking procedure.
B. To execute the closed computation on a variety of picture arrange like (jpeg, png, tiff, bmp) & broadcast organize like (mpeg, avi, flv).
C. To assess the execution of contemplated algo and premise of criterion like PSNR, MSE.
D. To perform the relationship of above algorithm (A protected picture based clandestine writing, morse alphabet and tide marking with protected key) with the obtainable computation (Investigation of protected video

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clandestine writing utilizing computer forensics procedure for improve statistics protected) depends on criterion like PSNR, MSE.

A. Endeavor is derivative for two algorithm encryption sidewise.

B. Unscrambling side. Employing encryption computation to the facts which we need to cover up and at that point on the getting side we concern unscrambling computation for de-confidential the facts which is cover up in picture or video[1,44]. So we unite both unscrambling and encryption algo and contrast it with the accessible algo will appear superior comes about for PSNR, MSE and implanting magnitude after clamor invasions. Algorithm is initially stacking the color RGB picture then past RGB picture is modification closed in YCbCr. We connected stage to stage DWT methods to picture afterward we chosen Y band to implant tidemark and connected lower to lower, lower to higher and higher to higher and higher to lower band to the tide marked picture. Then added clandestine rub utilizing slightest critical snippet (LSB) algorithm proceeding advance we included mystery key [8].We do on the encryption sidewise. Then on unscrambling side we execute inverse wavelet modification. We will translate YcbCr picture (it was produced in encryption side) to RGB color picture. At that point we will discover up the end consequences which are constancy degree (PSNR) amid original and tide marked picture and at that point we extract tidemark and mystery communication and will show PSNR standard values and chart amid 4L and 5L DWT too the charts of implanting magnitude and PSNR after clamor assault and its standard values as correlated to past end consequences [12,44].

C. Algorithm 3 Encryption Algorithm

Step 1: Stack unique color picture (RGB).
Step 2: Modification closed RGB to YCbCr.
Step 3: Concern 4L and 5L wavelet transmode.
Step 4: Decide on Y band to insert the tidemark.
Include to LL, HL, LH and HH separately.
Include to (HL + LH) together.
Include to (HL + LH) and some recurrences of HH.
Step 5: Reserved the location of the unique picture afflicted by the tidemark.
Step 6: Include mystery communication utilizing LSB procedure.
Step 7: Include mystery key. B. De confidential Algorithm
Step 8: Apply reverse wavelet trans mode.
Step 9: Modification closed YCbCr to RGB.
Step 10: Discover up constancy degree (PSNR) amid original and tide marked picture. Step 11: Extricate tidemark and mystery communication.
Step 12: Show PSNR standard values and chart amid 4L and 5L DWT, moreover inserting magnitude graph and its standard values and PSNR after clamor assault.
Step 13: leave from all steps.

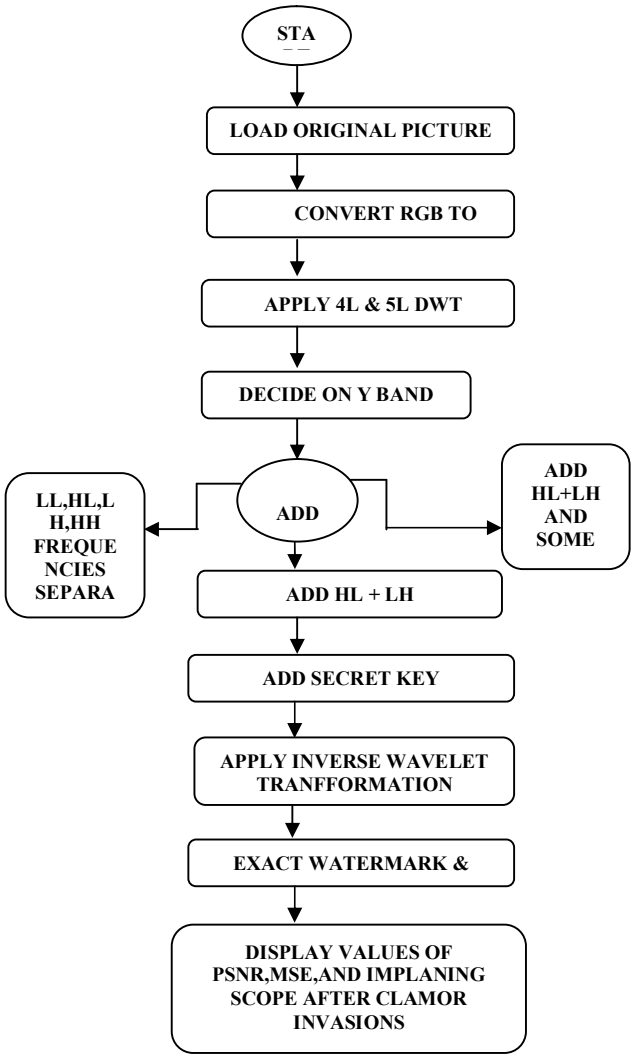

Fig. 5 Block diagram of proposed wor.

Algorithm 4 **Conventional Algorithm**

Step 1: Stack unique color picture (RGB).
Step 2: Modification closed RGB to YCbCr.
Step 3: Concern 4L wavelet transmode.
Step 4: Choose Y band to insert the tidemark.
Include to LL, HL, LH and HH separately.
Include to (HL + LH) together.
Include to (HL + LH) and some recurrences of HH
Step 5: Reserved the location of the unique picture influenced by the tidemark.
Step 6: Concern reverse wavelet trans mode.
Step 7: Modification closed YCbCr to RGB.
Step 8: Discover up constancy degree (PSNR) amid original and tide marked picture.
Step 9: Extricate tidemark.

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Step 10: Show PSNR standard values and chart amid 4L DWT.

Step 11: Departed from Steps.

Our contemplated endeavor on criterion like PSNR, MSE and implanting magnitude. This fundamental thought is to assess a only numeral that will appear the worth of recreated picture. Remade picture can be judged superior with higher measurements [6]. More closed the traditional SNR actions are not assumed to evaluate person personal recognitions [44,56].

[7]. Here we will utilize flag to clamor proportions since of their easy computation, as we accept that continuously advanced procedures do not cruel superior worth [3]. To begin with we will calculate cruel square mistake (MSE) of recreate picture as takes after

$$\mathrm{MSE} = \frac{\sum [\mathrm{f}(\mathrm{i},\mathrm{j}) - F(i,j)]^2}{N^2}$$

In altered way to calculate PSNR we will first calculate MSE as per subsequent mathematical statement

$$\mathrm{MSE} = \frac{\sum_{M,N} [I_1(m,n) - I_2(m,n)]^2}{M * N}$$

In this condition, M and N are the numeral of rows and columns in the input pictures, respectively. Then the square calculates the PSNR utilizing the subsequent condition:

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

PSNR in decibels (dB) is calculated by using

$$\mathrm{PSNR} = 20\log_{10}\left(\frac{255}{\mathrm{RMSE}}\right)$$

V Algorithm of the proposed method

Based on the above discussions the detailed algorithms for mosaic image creation ansd secret image recovery may now be described respectively as algorithm 1 and 2

Algorithm 1 mosaic image creation

Input: a secret image S a target image T , and a secret key K.

Output: a secret fragment visible mosaic image F.

Stage 1: fitting the tilke image into the target blocks

If the size of the target image T is different from that of the scecret image S change the size of T to be identical to that of S and divide the secret image S into n tile images{T1,T2,……Tn} as well as the target image T into n target blocks {B1,B2,B3 ….Bn} with each Ti or Bi being of size N_T.

Step 2: Compute the means and the standard deviation of each tile image Ti and each target block Bj for the three color channels according to 1 and 2 and comput accordingly the average standard deviations for Ti and Bj respectively for i=1 through n.

Step 3: sort the tile image in the set Stile = { T1,T2……..Tn} and the target blocks in the computer average standard deviation values of the blocks map in the sorted S target ina 1 to -1 manner and reorder the mappings according to the indices of the tile images resulting in a mapping sequence L of the form T_iB_j,T_2B_j--.T_n $B_{Jn.}$

Step 4: create a mosic image F by fitting the tile images into the corresponding target blocks according to L.

Stage 2 :- performing color conversions between the tile images and the target blocks.

Step 5: create a counting table TB with 256 entries each with an index coreesponding to a residual value and assign an initial value of zero to each note that each residual value will be in the range of 0 to 255.

Step 6: for each mapping Ti↦ Bij in sequence L represent the means µc and µc' of Ti and Bji respectively.by eight bits and represent the standard deviation quotiednt qc appearing in (3) by seven bits according to the scheme described in section III A

Where c = r,g,b.

Step 7 : for each pixel pi in each tile image Ti of mosaic image F with color value ci where c= r,g,b.transform ci into a new value ci'' by (3) if ci'' is not smaller than 255 or if it is not larger than 0,then change ci'' to be 255 or 0 respectively compute a residual value ri for pixel pi by the way described in section III C and increment by 1 the count in the entry in the counting table tb whose index is identical to r.

stage 3 rotating the tile images.

Step 8. Compute the RMSE PSNR MSE NCC NAE values of each color transformed tile image Ti in F with respect to its corresponding target block Bji after rotating T I into eaxch of the directions theta = 0 degree,90 degree,180 degree,and 270 degree. And rotate T I into the optimal directions theta zero wuth the smallest rmse mse nae ncc value.

Stage 4. Embedding the secret image recovery information

Step 9. Conruct the table HT using the content of the counting table TB to encode all the residual values computed previously.

Step 10 . for each tile image Ti in mosaic image F construct a bit stream Mi for recovering Ti in the way as

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described in section III D including bit segments which encode the data items of

1.The index of the corresponding target block Bji
2. the optimal rotation angle theta of Ti
3. the means of Ti and Bji and the related standard deviation quotients of all three color channels and
4. the bit sequence for overflow/underflows with residuals in Ti encoded by the table HT constructed in step 9.
Step11. Concatenated the bit streams Mi of all Ti in F in a raster scan order to form a total bit stream Mt, use the secret kwy K to encrypt Mt. into another bit stream M't. and embed M't into F by the reversible contrast mapping scheme proposed.
Step 12Construct a bit stream I including 1. The number of conducted iterations Ni for embedding M't.2. the number of pixel pairs N pair used in the last iteration and 3. The table HT constructed for the residuals, and embed the biut stream I into mosaic image F by the same scheme used in step 11.

Algorithm 2 Secret image recovery

Input : a mosaic image Fwith n tile images { T1,T2,T3,……..Tn} and the secret key K.
Output: the secret image S
Steps:
Stage 1. Extracting the secret image recovery information
Step1. Extract from F the bit stream I by a reverse version of the scehme proposed and decode them to obtain the following data items.
1. The number of oiterations Ni for embedding M't.
2. the total number of used pixel pairs N pair in the last iteration
3. the table HT for encoding the values of the residuals of the overflows /underflows.
Step2 . extract the bit stream M't using the values of N I and N pairs by the same M't into Mt by K.
Step3 . decrypt the bit stream M't into Mt by K.
Step 4. Decompose Mt into n bits streams M t through Mn for the n to be constructed tile images T I through T n in S,respectively.
Step 5.Decode Mi for each tile image Ti to obtain the following data items
1. the index ji of the block Bji in F corresponding to Ti
2. The optimal rotation angle theta of Ti
3.The mean of Ti and Bji and the related standard deviation quotients of all color channels
4. The poverflow/underflow residual values in Ti decoded by the Huffman table HT.
Stage 2. Recovering the secret image
Recover one by one in a raster scan order the tilke images Ti, I = 1 through n of the desired secret image S by the following steps
1. Rotate in the reverse direction the block indexed by ji,namely Bji in F through the optimal angle theta, and fit the resulting block content into Ti to form an initial tile image Ti
2. use the extracted maens and related standard deviation quotiesnts to recover the original pixel value in Ti according to (6)
3. Use the extracted means ,standard deviation quotients and
5. To compute the two parameters Cs and Cl
4. scan Ti to find out pixels with values 255 or 0 which indicate that overflows or underflows. respectively.
Have occurred there
5. add respectively the values Cs or Cl to the corresponding residual values of the found pixels
6. Take the results as the final pixel values , resulting in a final tile image T i.
Step 7. Compose all the final tile image to form the desired secret image A as output.

Block Diagram of Proposed algorithm **Algorithm 4**

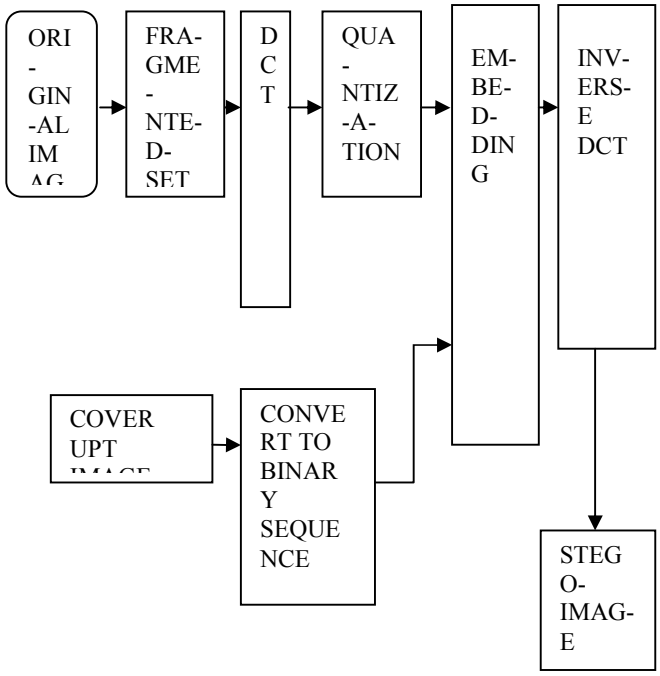

Fig 5 Outflow chart depiction of contemplated endeavor.

V. Experimental Results

A series of experiments have been conducted to test the proposed method using many secret and target images with sizes 1050 * 876 or 876 * 1050.To show that the created mosaic image looks like the preselected target image, the quality metric of root mean square error (MSE,

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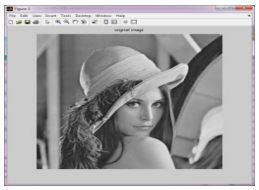
PSNR, NCC, NAE, RMSE)is utilized Which is defined as the square root of the mean square difference between the pixels values of the two images.
An example of experimental results is shown in below fig Show the created moaic image using nbelow fig as the target image.Tbe tile image size is 8*8,.the recovered secret image using a correct key is shown in fig (d). which looks nearly identical to the original secret image shown in below fig with RMSE = 0.937 with respect to the secret image. It is noted by the way that all the order experimental results shown in this thesis have small RMSE values as well as seen in Fig .

(A)



(b)

(c)

(d)

(e)

(f)

(g)

(h)

(i)

Fig. 6 Experimental output of proposed work.

Fig experimental results of mosaic images creation a. secret image b. target image c. mosaic image created with tile image size 8*8 d. recovered secret image using a correct key with RMSE =0.948 with respect to secret image (a). e. recovered secret image using a wrong key . (f)-(i) mosaic image created with different image sizes 16*16 , 24*24,32*32 and 40*40. Fig experimental results of mosaic images creation a. secret image b. target image c. mosaic image created with tile image size 8*8 d. recovered secret image using a correct key with RMSE =0.948 with respect to secret image (a). e. recovered secret image using a wrong key . (f)-(i) mosaic image created with different image sizes 16*16 , 24*24,32*32 and 40*40. A series of experiments have been conducted to test the proposed method using many secret and target images with sizes 1050 * 876 or 876 * 1050.To show that the created mosaic image looks like the preselected target image, the quality metric of root mean square error (MSE, PSNR, NCC, NAE, RMSE)is utilized Which is defined as the square root of the mean square difference between the pixels values of the two images.
An example of experimental results is shown in below fig Show the created moaic image using n below fig as the target image. Tbe tile image size is 8*8,.the recovered secret image using a correct key is shown in fig (d). which looks nearly identical to the original secret image shown in below fig with RMSE = 0.937 with respect to the secret image. It is noted by

the way that all the order experimental results shown in this thesis have small RMSE values as well as seen in Fig.
Moreover above fig c shows the recovered secret image using a wrong key which is a noise image fig (f)-(i) show more results using different tile image size.it can be scan from the figures that the created mosaic image retians more details of the target image when the tile image is smaller.
It can also be seen that the blockness effect is observable when the image is magnified to be large but if the image is observed as a whole it still looks like a mosaic image with its appearance similar to the target image. Fig (a) also shows that this fact in another way-a moisaic image created with smaller tile images has a smaller RMSE value with respect to the target image. On the other hand the number of required bits embedded for recovering the secret image will be increased when the tile image becomes smaller as vcan be seen from fig (b).

VI. SECURITY CONSIDERATION

In order to increase the security of the proposed method the embedded information for later recovery is encrypted with a secret key as seen in algorithm 1.only the receiver who has the key can decode the secret imge however an eavesdropper who does not have the key may still try all possible permutations of the tile image in the mosaic image to get the secret image back. Fortunately the

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number of all possible permutations here is n! and so the probability for him her to correctly guess the permutation is p=1/n! which is very small in value.foor example for the typical case in which we divide a secret image of size 1050*780 into tile image with block size 16*16 the value n is (1050*780)/16*16 =3120. So the probability to guess the permutation correctly without key is 1/n! = 1/(3120!).so breaking the system by this way of guessing is computationally infeasible.

In fact we can view the addressed problem here as a square jigsaw puzzle problem, which is to reconstruct a complete image from a set of unordered square puzzle parts. recently many methods have been proposed to try yo solve this problem automatically by utilizing measures of feature based similarity. Dissimilarity based compatibility ,prediction based compatibility and so on. But these state of art methods can only solve partially problems with limited numbers of puzzle parts automatically. also the jigsaw puzzle problem has been proved to be NP complete. Which means that we cant solve the problem in polynomial time. in fact the time complexity is n!= 2n(n/e)n
as mentioned which is too big a number as well for our case here with n=3120.
However when n is much smaller say smaller than 1000 some compatibility metrics may be utilized to solve the square jigsaw problem.

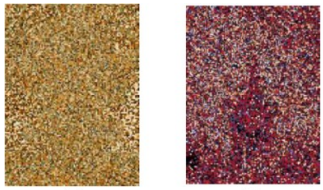

Fig 7 (a)(b) correct permutation of tile image in the mosaic image without recovering the original color characterstics
a.correct permutations of the image of fig [c-d]
b. correct permutation of tile image.

So a large value of n should be used to increase the security of the proposed method in addition the addressed puzzle problem of the proposed method is more complicated than the conventional square jigsaw puzzle problem because the color characteristics of the puzzle parts have been changed that is adjacent puzzle parts have different colr appearances meaning that a greedy search using color similarities between originally adjacent fragments for image reconstruction as done in conventional manual reconstruction techniques is infeasible .either.

Furthermore even if one happens to guess the permutation correctly such as rhe correctly guessed permutation shown in below fig (a)(b)he she stills does not know the correct parameters for recovering the original; color appearance of the secret image because such parameter information for color recovery is encrypted as a bit stream using a secret key.even so it still should be assumed in the extreme case that he she eill observe the content of the mosaic image with a correct permutations.and try to estimate rough version of the the secret image.to increase the security of the proposed method against this type of attack, one possible way to is to use the key to randomize important information of a secret image,such as the positions of the pixels in the secret image, before transforming the secret image into a mosaic image by the proposed method.consequnetly only authorizedusers with the key can know the correct secret image while an attacker can't.

VI . RESULTS

Experimental Test Results

1 Pantile Images

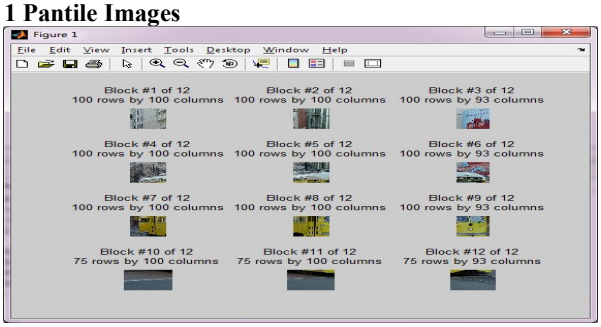

Fig.8 Divisions of secrete image into pantiles

Here, are some comparison measures which are based on MSE, PSNR, NAE, NCC, result analysis of Existing Work and Results analysis of proposed work

No. of Pantiles	M.S.E.	N.A.E.	N.C.C.	P.S.N.R.
6	0.17	0.0003	1.1600	59.2
12	0.18	0.00055	1.1630	59.5
15	0.28	0.00050	1.1789	60.4
18	0.27	0.00068	1.1620	59.6
20	0.28	0.0005	1.7350	60.3

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No. of Pantiles	M.S.E.	N.A.E.	N.C.C.	P.S.N.R.
6	0.201	0.0017	1.0008	54.79
12	0.22	0.0018	1.0011	54.78
15	0.31	0.0016	1.0011	55.79
18	0.29	0.0017	1.0012	54.35
20	0.297	0.0019	1.0008	55.85

Table 1 comparison between existing work and latest work results

2 End Image

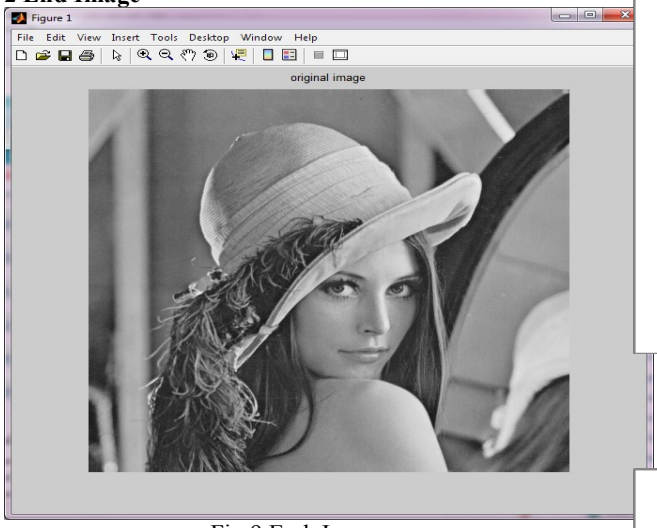

Fig.9 End Image.

3 Montage Image

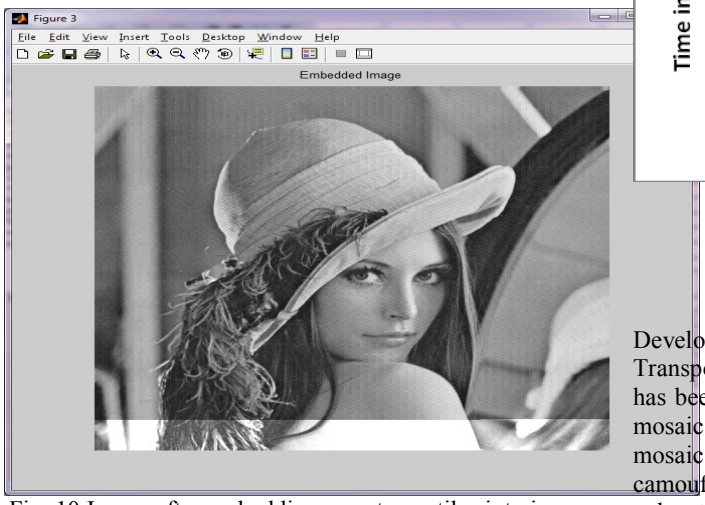

Fig. 10 Image after embedding secrete pantiles into image

4 Comparison Based on the error rate

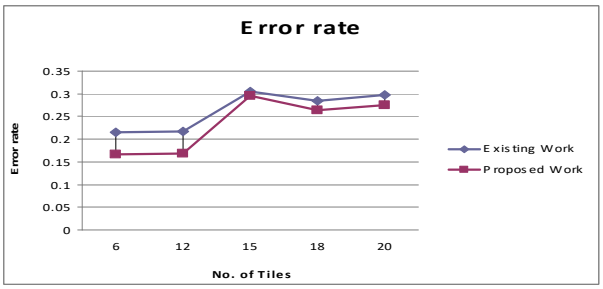

Fig. 11 comparative analysis of error rate

5 Comparison Based on the computation Time

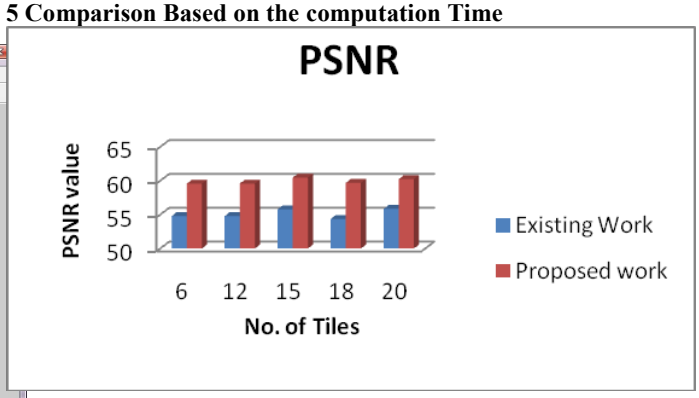

Fig. 12 Comparison Based on the computation Time

6.6 Comparative Analysis of Computation Time

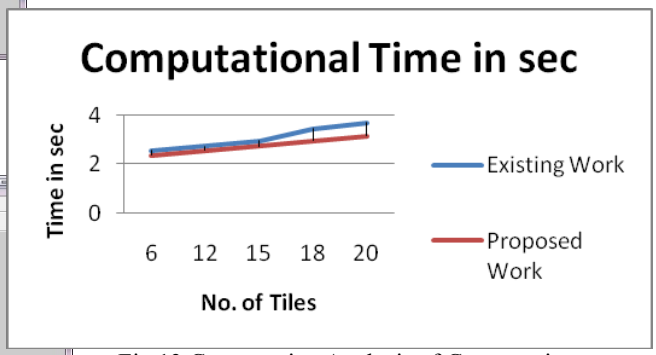

Fig.13 Comparative Analysis of Computation Time.

VII. CONCLUSION

Development of an Efficient and Clandstine Image Transposal Algorithm Using 16 *16 Quantization Table has been proposed, which not only can create meaningful mosaic images but also can transform a secret image into a mosaic one with the same data size for use as a camouflage of the secret image by the use of proper pixel color transformations as well as a skillful scheme for

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handling overflows and underflows in the converted values of the pixels 'colors, secret fragmented visible mosaic images with very high visuals similarities to arbitrarily selected target images can be created with no need of a target image database. also the original secret images can be recovered nearly loss less from the created MOSAIC IMAGES. Good experimental results have shown the feasibility of the proposed method. Future studies may be directed to applying the proposed method to images of color models other than the RGB.

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