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**SQUEEZING OF COLOR IMAGE USING SELECTIVE ROTATION BASED
PRELIMINARY PLAN**

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ABSTRACT

In this paper, for a perfect and effective image squeezing, the direction selective image squeezing preliminary plan is introduced. This preliminary plan performs the collective directional transform in sometime depends on plan and sometimes seeming unfair direction and get a transform coding gain. By using this phenomena, easily maximize the energy compaction. For this compaction, firstly determines the maximum energy direction of an image and after that the sinc interpolation method or three pass algorithms is used for rotating the image and after that the conventional 2-D wavelet transform are used for decomposition of image. The convolution method or lifting method is used for conventional wavelet transform. It outperforms JPEG2000 for typical test image.

Keywords: Image squeezing, Directional wavelet transform, Texture of image, Sinc interpolation.

I. INTRODUCTION

The discrete wavelet transform are used for squeezing the image since 1990. In the 2D-DWT squeezing technique, two one dimension are used for vertical & horizontal direction respectively [1]. The image have two types of singularities in which the 2-D discrete wavelet transform (Traditional 2-D DWT) are able to capture point singularities with more effectiveness but at the time of capturing line singularities it becomes failed. It got failed because alignment of horizontal or vertical direction of image and edges & contour in images are not perfect. This imperfectness can be solving by using a new transform by filtering the image in both direction.

In this paper, I am going to introduce the discrete wavelet transform which is based on image rotation. By using this phenomenon, it is predicted that the direction for edge & texture image is improved. Thus, the coding performance of adaptive directional wavelet transform can be improved [10].

In this paper, the 2-D transform, which is introduced, performs the work. Firstly the image is rotated by determined angle then orientation of both of edge & texture comes in vertical & horizontal direction. After that the image is rotated and goes in next step of traditional wavelet transform for decomposition of image and at last coding work will be performed [2].

II. PERTAIN WORK

If the alignment of edges & contour are not perfect with horizontally & vertically then the energy of image is spread across the sub band which is the property of DWT. To solve the problem of energy spreading in sub bands, the directional transform is required.

There are two categories are defined for adaptive transform which are:- First category is used for analysis the image along the set of direction which is predetermined[3]. Second category is used for analysis the direction itself to the orientation feature of image [3], [4], [7], [8]. On the other hand, two types of adaptive wavelet transform & lifting structured based transform are proposed because both are suitable for filtering the direction to the orientation of edges & texture[5],[7],[10]. To minimize the prediction error, use different types of direction selection method which is given in [7],[8].

III. SELECTIVE ROTATION BASED PRELIMINARY PLAN

In normal squeezing technique, transformation, quantization and encoding are followed but in this paper, gradient detector, image rotator; conventional wavelet transformation and encoding are used

First Step:-

The gradient of image (i.e. $\nabla p(x,y)$) is determined. The gradient of image is given by:-

$$\nabla p(x,y) = p(x,y) * h1(x,y)ax + p(x,y) * h2(x,y)ay$$

Where
 $u=(x,y)$ is arbitrary pixel of image
 *Convolution operator

The value of h1 and h2 is given by:-

$$h1(x,y) = \begin{vmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{vmatrix}$$

$$h2(x,y) = \begin{vmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{vmatrix}$$

Second Step:-

The smoothness of the image is determined. For determination, comparing gradient detector with threshold value(S).

$$|\nabla P(x,y)| \geq S$$

Where:

$$|\nabla p(x,y)| = \max \{ |p(x,y)*h1(x,y)|, |p(x,y)*h2(x,y)| \}$$

After that, this smooth image is processed as JPEG2000 and edge & texture image, use proposed preliminary plan. The energy of a signal is determined which is useful for determining the direction that contains maximum energy for edge image .The directional energy of signal is given by:-

$$EK(U1) = \sum Ek(u) = \sum (\nabla p(u), ak)^2$$

Where:

ak: unit vector in k direction

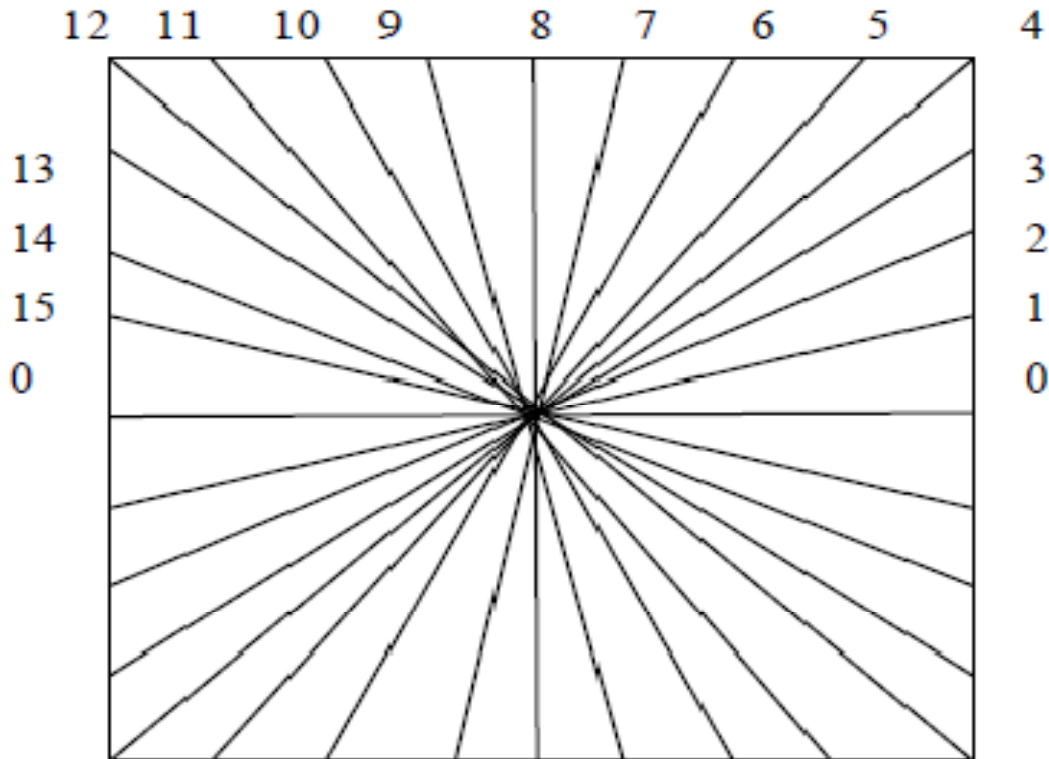


Figure A: Direction Diagram

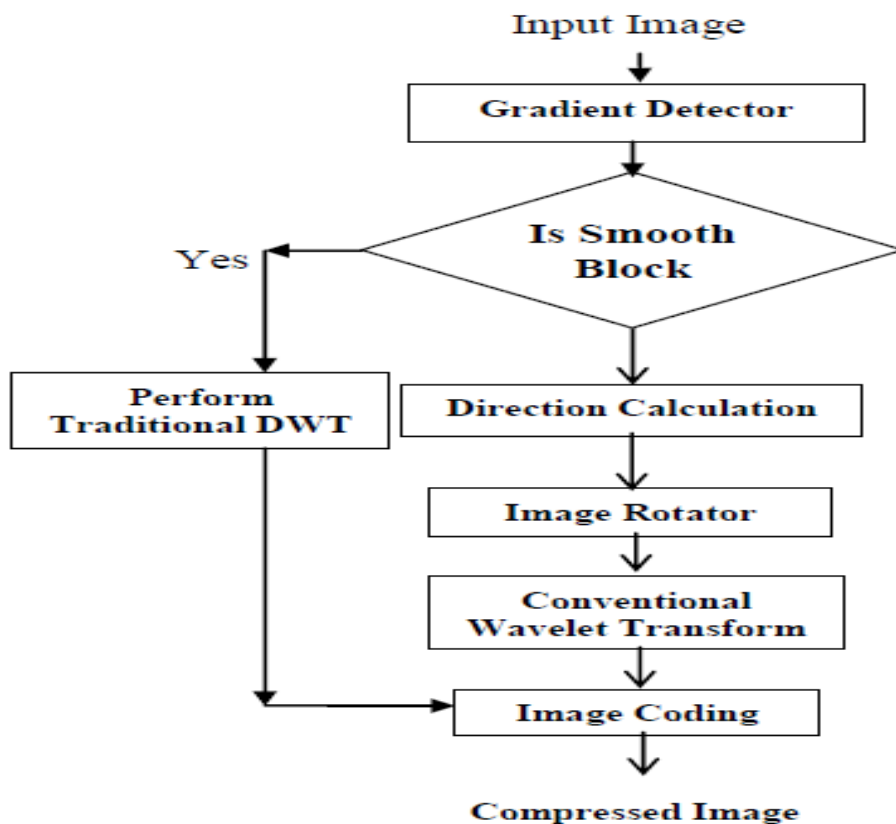


Figure B: Forward 2-D directional wavelets transform

There are two types of algorithm is necessary for squeezing and reconstruction of image.

A. Algorithm for squeezing

There are four steps which covers the algorithm of squeezing.

Step1) Firstly image is passed through the gradient detector. This gives the information of smoothness of image.

Step2) There are two conditions, first one is if image is smooth then traditional wavelet transform is used for squeezing the image and go for next step of coding. Another is if image is not smooth then direction detector determines the direction of orientation of edges & texture.

Step3) The direction is calculated then image is rotated by an angle. This angle depends on the direction of orientation. This work is performed by sinc interpolation. The value on angle for nth directional is given by:-

$$(180/16)*n$$

Step4) In this step, the conventional 2-D wavelet transform is used. When take horizontal & vertical wise transform then approximation, horizontal, vertical and diagonal sub bands are generated. The lifting wavelet transform is also responsible for generating the wavelet sub bands. This phenomenon is shown in figure D.

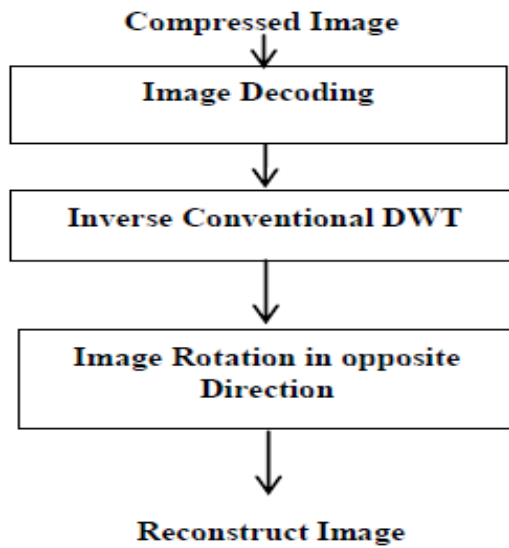


Figure C: Reverse 2-D directional wavelet transform

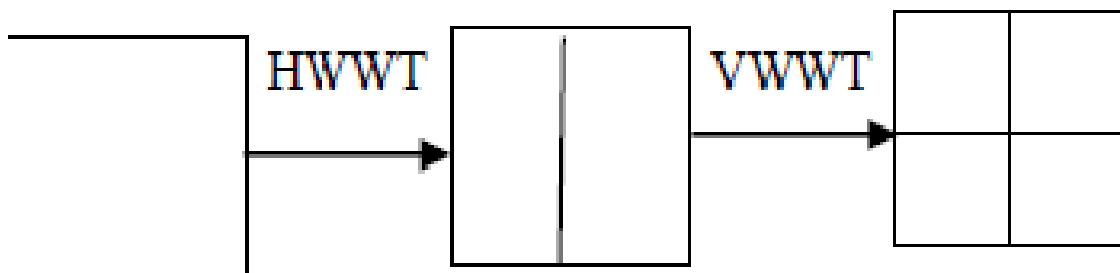


Figure D: Generating sub bands by conventional wavelet transform

B. Algorithm for reconstruction

There are only three steps which covers the algorithm of reconstruction.

Step1) In this step, coding preliminary plan is used for decoding the image.

Step2) In this step, this decoded image is synthesized by using inverse DWT transform.

Step3) At last, image is rotated in opposite direction by that angle by which image is rotated in squeezing.

Thus, these two algorithms are necessary for squeezing and reconstruction of the color image using selective rotation based preliminary plan.

IV. PERFORMANCE WITH CODING OF IMAGE

The results of the coded image are compared between the JPEG2000 squeezing arrangement & 2D-DWT arrangement. The wavelet sub bands are same in both squeezing preliminary plan. In this squeezing preliminary plan, squeezed bit stream is organized by utilization of uniform quantizer, EBCOT and MQ coder.

Squeezing ratio=Set as the input of squeezing system

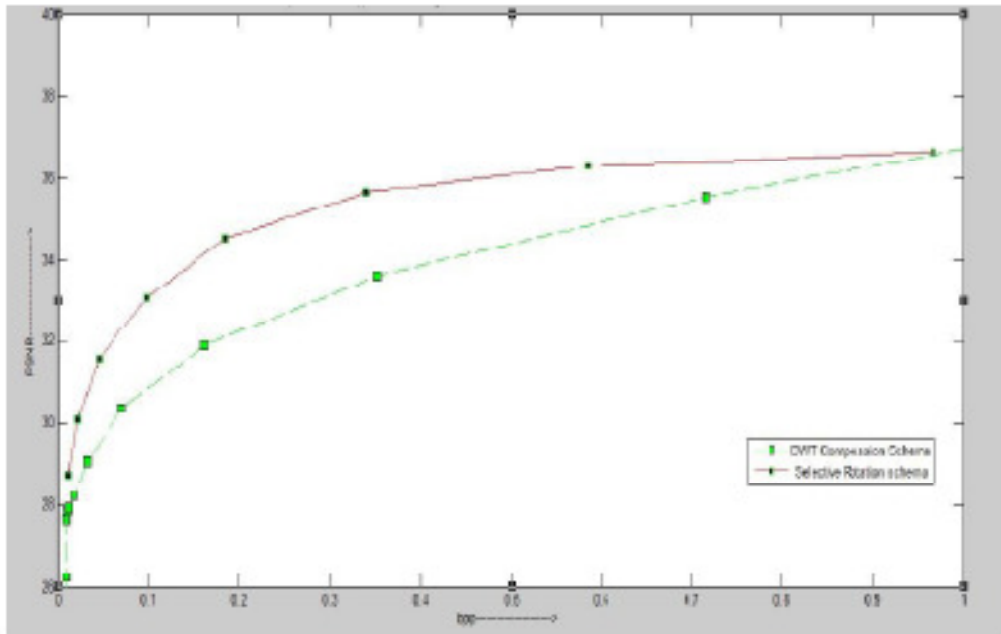


Figure E: Performance analysis by JPEG2000 and proposed squeezing preliminary plan for housing

In this figure E, the PSNR (peak signal to noise ratio) values with experimental results are included and also shows that the proposed preliminary plan is better than JPEG2000.

Thus, for performance checking in image squeezing, the comparison between the JPEG and proposed preliminary plan is shown in table. The unit of performance of image is decimals.

TABLE A: COMPARISON BETWEEN THE JPEG2000 AND PROPOSED PRELIMINARY PLAN FOR PERFORMANCE IN IMAGE SQUEEZING

Image	Size	bpp	JPEG 2000	Proposed scheme
House	256*256	0.1	30.37	33.06
		0.25	31.89	34.53
		0.5	34.04	35.98
		1	36.6	36.6
Barbara	256*256	0.1	24.23	25.46
		0.25	28.24	30.05
		0.5	32.11	33.69
		1	37.09	37.09
Lena	256*256	0.1	28.34	29.04
		0.25	33.74	34.50
		0.5	37.01	37.40
		1	40.6	40.67
Baboon	256*256	0.1	21.34	21.46
		0.25	23.06	23.28
		0.5	25.48	25.88
		1	29.01	29.07



Figure F: Figure showing reconstructed image

V. CONCLUSION

In this paper, 2-DWT method is presented with preliminary plan with direction determining method. The proposed transform gives a preliminary plan of concentrating more energy of signal in low pass band and squeezed image in proposed transform gives better result comparison to JPEG2000.

VI. FUTURE WORK

For future work, this preliminary plan can be used for video coding which is based on wavelet at low computational complexity

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