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NOVEL COMPARISON METHOD FOR PASSPORT IMAGE APPLICATION

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ABSTRACT
In any image application required large storage space to store image information without harming quality of image. In this paper, we propose a Laplacian model to reduce memory storage space and enhance quality of image. Our proposed model name is a Laplacian Transparent Composite Model developed for discrete cosine Transform coefficient to handle flat tail phenomenon which is present into it commonly. This model having better accuracy and additional data reduction capability. This proposed method is compared with High Efficiency Video coding (HEVC) method. HEVC compressed images is taken and both the method is compared with three parameter such as Peak Signal to Noise Ratio (PSNR), Mean Squared Error (MSE) and Compression Ratio.

KEYWORDS: Image Compression, Discrete Cosine Transform, Accuracy, Soft Decision Quantization, Peak Signal to Noise Ratio, Compression Ratio.

INTRODUCTION
There are various techniques that can be used to compress the images [1]. In our proposed model, First image is compressed using block Discrete Cosine Transform (DCT) [2] [3]. Instead of normal DCT here we used block DCT because humans are unable to see the aspects of an image at high frequency. Since taking the DCT allows us to isolate where these high frequencies are, so we can take advantage of this in choosing which values we want to preserve [4]. The coefficients which present at the last edges that we called flat tail phenomenon are considered in LPTCM method when images are encoded. LPTCM uses DCT coefficient as a input. Given a sequence of DCT coefficient, the LPTCM first separate the tail from main body of the sequence. LPTCM identified the outliers which is present into images. They are important and generally large in magnitude; convey some unique global features of the image. Such as unique edges and textures which are perceptual importance [4] [5]. If they are not properly quantized and encoded, it would significantly deteriorate the Rate Distortion (RD) performance. These outliers should be handled wisely and separately from inliers in order to achieve better RD performance in DCT-based non-predictive image coding systems.
The performance of LPTCM based compression technique is compared with compression technique using HEVC method. HEVC is video compression technique which also can be used for single image compression. One advantage of HEVC is the improved intra coding of video frames. HEVC is a method used for video compression and here it is used for still image compression [6].
The performance of proposed method and HEVC is analyzed using following parameters:-

1. PEAK SIGNAL TO NOISE RATIO (PSNR): It is a term for the ratio between the maximum possible power of a signal and the power of corrupting noise that affects the fidelity of its representation. PSNR is usually expressed in terms of the logarithmic decibel scale.

2. MEAN SQUARED ERROR (MSE): The MSE assesses the quality of an estimator (i.e., a mathematical function mapping a sample of data to a parameter of the population from which the data is sampled) or a predictor (i.e., a function mapping arbitrary inputs to a sample of values of some random variable). Definition of an MSE differs according to whether one is describing an estimator or a predictor.

3. **COMPRESSION RATIO**: Compression ratio is defined as the ratio between the uncompressed size and compressed size.

PROPOSED METHODOLOGY
BLOCK DIAGRAM

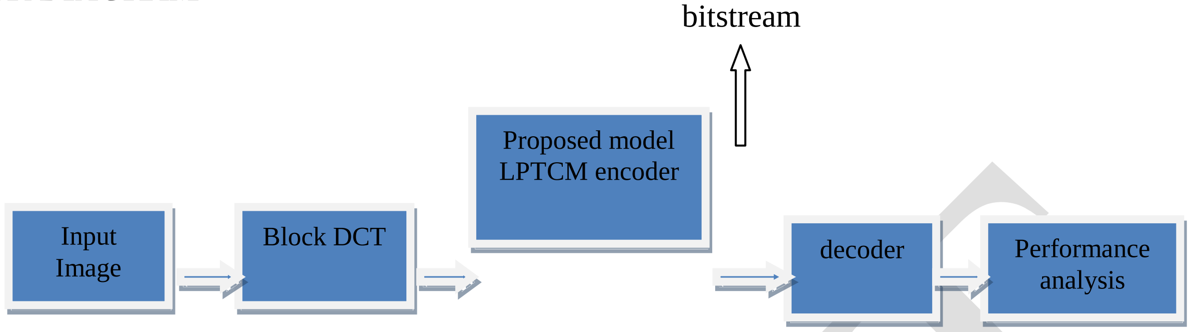

Figure1: Block Diagram of proposed system

PROCEDURE:

Our proposed LPTCM based compression system shown in figure.1. First input image is compressed using block discrete cosine transform. Output of DCT consist different AC coefficient in different order, to sequence that AC coefficient we use LPTCM. The LPTCM first separates tail from the main body of sequence and then uses uniform distribution to model DCT coefficient in flat tail. The resulting LPTCM will not only achieve superior modelling accuracy, but also will have good capability of non linear data reduction by identifying and separating a DCT coefficient in the flat tail from the main body.

The outliers identified by the LPTCM in an image are usually important. However, they are generally large in magnitude and convey some unique global features of the image, such as unique edges and textures, which are of perceptual importance [4, 5]. If they are not properly quantized and encoded, it would significantly deteriorate the Rate Distortion (RD) performance in general. As such, outliers should be handled wisely and separately from inliers in order to achieve better RD performance in DCT-based non-predictive image coding systems.

Outliers and inliers are separated from each other by using LPTCM parameter that is Yk . It is known as truncation point or separation boundary. AC's beyond truncation point is called outliers and those inside it called inliers. To quantize the inliers in an image proposed model uses Constrained Dead-Zone Quantizer (CDZQ). For truncated Laplacian sources, the CDZQ generally offers better RD performance than do standard dead zone quantizer. First λk (scale parameter of Laplacian model), Yk (truncation point), d (pre-determined distortion level) is defined to obtain CDZQ parameter. Algorithm for finding CDZQ parameter (at slope α) is stated below:-

Step1: Given λk, Yk, d initialize α >0, αL < α , αH> α
Calculate optimal distortion profile (opt D).
While opt D>d.
Step2: Calculate largest possible quantized index Lk and quantization step size uk till opt D>d
Step 3: if opt D<d
Then αH =α
Where, α = (α +α L)/2
Step 4: else αL=α
So, α = (α + αH)/2.
End.

Then for improving decoded image quality, we used Soft Decision Quantization for inliers in an image [7].Quantization levels are defined due to that each block is compared with this levels and assigned with the particular level when match found. Then encode this level into binary bit stream. After that this bit stream is decoded via reverse procedure and we get decoded image whose quality is improved through LPTCM. Image quality of our proposed method is compared with another method that is HEVC via some parameter like PSNR, MSE...etc.

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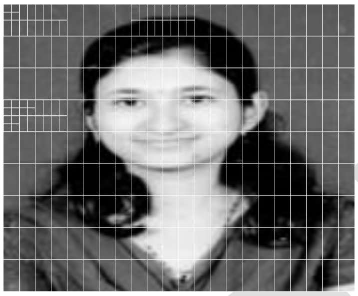
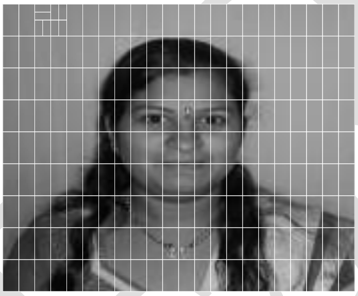
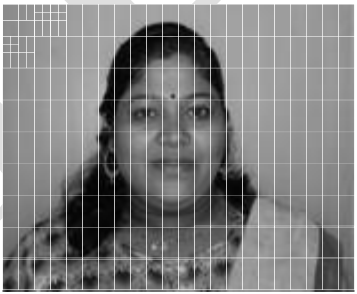
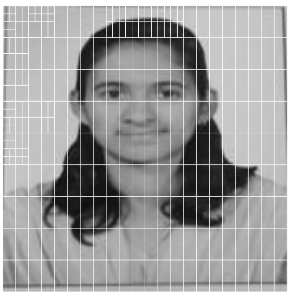
RESULT AND DISCUSSION

First, we take passport size input image in .bmp format. Here we perform operation on multiple images. Then compare decoded output images with HEVC compressed images with parameters like peak signal to noise ratio, mean squared error, compression ratio..etc.

Following table shows input images and their encoding processed images, also decoded images. Here we take 4 different input images.

Table .1 Result of LPTCM method

Sr no	Input image	Encoding processed image	Decoded image
Image 1			Decoded Output 
Image 2			Decoded Output 
Image 3			Decoded Output 
Image 4			Decoded Output 

Our method output images analysed with another method that is HEVC. Both method images analysed through PSNR, MSE, and compression ratio.
Following table shown comparison of Peak Signal Noise Ratio parameter.

Table2. PSNR comparison of both methods

Sr No	Proposed Model(LPTCM) PSNR	Comparison Method(HEVC) PSNR
Image 1	29.5705	16.4731
Image 2	13.797	10.1154
Image 3	1 12.0553	10.6113
Image 4	16.4624	12.0366

Table2. Shows better PSNR result of our proposed method than HEVC method. Similarly Mean Squared Error of both method comparisons is shown below table 3.

Table3. Mean Squared Error comparison of both methods.

Sr No	Proposed Model(LPTCM) MSE	Comparison Method(HEVC) MSE
Image 1	192.454	536.847
Image 2	302.765	566.915
Image 3	33.0291	288.574
Image 4	143.260	423.694

Now following table shows Comparison Ratio (CR) of both method. It indicates that our comparison ratio is better than HEVC.

Sr No	Proposed Model(LPTCM) CR	Comparison Method(HEVC) CR
Image 1	7.3252	1.0419
Image 2	8.0457	1.0418
Image 3	8.1124	1.0451
Image 4	7.399	1.0398

CONCLUSION

In this paper**,** the proposed model LPTCM is compare with HEVC method. Due to all of the result, we find proposed model having better PSNR as compared to HEVC method. Also compression ratio of our model is 8 times better than HEVC. LPTCM output image size is also reduced due to storage space is less required and quality of image is enhanced so, for image storage application our model will useful like passport image application in future.

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