

# **Adaptive Spectral Transform for Wavelet-Based Color Image Compression**

## **ABSTRACT:**

Since different regions of a color image generally exhibit different spectral characteristics, the energy compaction of applying a single spectral transform to all regions is largely inefficient from a compression perspective. Thus, it is proposed that different subsets of wavelet coefficients of a color image be subjected to different spectral transforms before the resultant coefficients are coded by an efficient wavelet coefficient coding scheme such as that used in JPEG2000 or color set partitioning in hierarchical trees (CSPIHT). A quad tree represents the spatial partitioning of the set of high frequency coefficients of the color planes into spatially oriented subsets which may be further partitioned into smaller directionally oriented subsets. The partitioning decisions and decisions to employ fixed or signal-dependent bases for each subset are rate-distortion (R-D) optimized by employing a known analytical R-D model for these coefficient coding schemes. A compression system of asymmetric complexity, that integrates the proposed adaptive spectral transform with the CSPIHT coefficient coding scheme yields average coding gains of 0.3 dB and 0.9 dB in the Y component at 1.0 b/p and 2.5 b/p, respectively, and 0.9 dB and 1.35 dB in the U and V components at 1.0 b/p and 2.5 b/p, respectively, over a reference compression system that integrates the single spectral transform derived from the entire image with the CSPIHT coefficient coding scheme.

## **EXISTING WORK:**

1. Only spatial correlation of the pixels inside the single 2-D block is considered and the correlation from the pixels of the neighboring blocks is neglected.
2. Impossible to completely de-correlate the blocks at their boundaries using DCT.
3. Undesirable blocking artifacts affect the reconstructed images or video frames. (high compression ratios or very low bit rates).

4. Since the input image needs to be "blocked," correlation across the block boundaries is not eliminated. This results in noticeable and annoying "blocking artifacts" particularly at low bit rates.

5. At compression ratios above 30:1, JPEG performance rapidly deteriorates, while wavelet coders degrade gracefully well beyond ratios of 100:1. At higher compression ratios, image quality degrades because of the artifacts resulting from the block-based DCT scheme.

6. Frequently changing colors in dense spaces cannot be represented well with few coefficients.

For example, a row of pixels interchanging between black and white pixel-by-pixel, is viewed as a high frequency in the frequency domain. However, a high frequency cannot be represented with few coefficients, and thus dropping high-order coefficients from the DCT removes the necessary detail. This is also the reason why diagrams are not compressed using jpeg compression.

7. DCT-based encoding algorithms are always lossy by nature.

8. Removal of high-frequency coefficients results in removal of certain frequencies that were originally present in the sine wave. After losing certain frequencies, it is not possible to achieve perfect reconstruction.

### **PROPOSED WORK:**

1. The Wavelet based transform is a pretty good technique for image compression. Correctly use the advantage that provide by Wavelet based is the key to achieve good result while keep a good compression ratio.

2. The small size Wavelet based is suitable for mobile applications using low power devices as fast computation speed is required for real time applications.

3. Low complexity, and high fidelity image compression using fixed threshold method.
4. Wavelet based is real-valued and provides a better approximation of a signal with fewer coefficients.
5. Wavelet based namely simplicity, satisfactory performance, and availability of special purpose hardware for implementation.
6. The Wavelet based is a widely used transformation in transformation for data compression. It is an orthogonal transform, which has a fixed set of (image independent) basis functions, an efficient algorithm for computation, and good energy compaction and correlation reduction properties.
7. The Wavelet based is fast. It can be quickly calculated and is best for images with smooth edges like photos with human subjects.
8. Wavelet based algorithms are capable of achieving a high degree of compression with only minimal loss of data. This scheme is effective only for compressing continuous-tone images in which the differences between adjacent pixels are usually small.
9. Studies have shown that Wavelet based provides better energy compaction than DFT for most natural images.
9. The decorrelation characteristics of Wavelet based should render a decrease in the entropy (or self information) of an image. This will, in turn, decrease the number of bits required to represent the image.

### **Hardware Requirements**

- SYSTEM : Pentium IV 2.4 GHz
- HARD DISK : 40 GB

- FLOPPY DRIVE : 1.44 MB
- MONITOR : 15 VGA colour
- MOUSE : Logitech.
- RAM : 256 MB
- KEYBOARD : 110 keys enhanced.

### **Software Requirements**

- Operating system :- Windows XP Professional
- Front End :- Microsoft Visual Studio .Net 2005
- Coding Language :- C# 2005.

### **Modules:**

1. Import Image.
2. Analyzing Image
3. Fuzzy filter Decoding
4. Compress to image.
5. Compress To mpeg.

### **Modules Description:**

#### **Import image**

User can import images of any type into the project. Most probably supported image Format is JPEG and BMP. Image container holds the image.

#### **Analyzing Image**

Image can be zoomed by the user in the ratio of 16\*16 pixel rate. Also the image blocks are classified. Every single pixel value listed out. Yuv format classification of image is possible.

### **Fuzzy filter Decoding**

Most popular decoding Format is Fuzzy filter decoding. .net framework filter Packages are used to create the fuzzy filter. After applying a fuzzy filter to an image its size becomes relatively low with good clarity of image. Percentages save of size also displayed in the message box.

### **Compress to image.**

Image Writing Classes are used to make the image after applying the Fuzzy Filter. Here image pixels are verified with original to make some of the quality regarding adjustments. So that the quality of image absolutely preserved after reduction

### **Compress To mpeg.**

This is an extra one Feature Module to make an mpeg Video file from an Image with the same quality and size reduction. Mpg is need in some websites to display images.

### **REFERENCE:**

Ulug Bayazit, “Adaptive Spectral Transform for Wavelet-Based Color Image Compression”, **IEEE Transactions on Circuits and Systems for Video Technology**, Vol. 21, No.7, July 2011.