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Systematic Approach for analysis of DWT over DCT Based Image Compression

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Abstract:- Image compression is a key technology in transmission and storage of digital images because of vast data associated with them. This research suggests a new image compression scheme with pruning proposal based on discrete wavelet transformation (DWT). The effectiveness of the algorithm has been justified over some real images, and the performance of the algorithm has been compared with other common compression standards. The algorithm has been implemented using Visual C++ and tested on a Pentium Core 2 Duo 2.1 GHz PC with 1 GB RAM.
Experimental results demonstrate that the proposed technique provides sufficient high compression ratios compared to othercompression techniques.
Keywords: MATLAB Programming and MATLAB coding.

I. INTRODUCTION

Advances over the past decade in many aspects of digital technology especially devices for image acquisition, data storage, and bitmapped printing and display have brought about many applications of digital imaging. However, these applications tend to be specialized due to their relatively high cost. With the possible exception of facsimile, digital images are not commonplace in general purpose computing systems the way text and geometric graphics are. The majority of modern business and consumer usage of photographs and other types of images take place through more traditional analog means.

The key obstacle for many applications is the vast amount of data required to represent a digital image directly. A digitized version of a single, color picture at TV resolution contains on the order of one million bytes; 35mm resolution requires ten times that amount. Use of digital images often is not viable due to high storage or transmission costs, even when image capture and display devices are quite affordable.

Image compression is an important topic in the digital world. Whether it be commercial photography, industrial imagery, or video. A digital image bitmap can contain considerably large amounts of data causing exceptional overhead in both computational complexity as well as data processing. Storage media has exceptional capacity; however, access speeds are typically inversely proportional to capacity.

II. Principles behind Compression.

Number of bits required to represent the information in an image can be minimized by removing the redundancy present in it. There are three types of redundancies:

2.2.1: Spatial redundancy

Which is due to the correlation or dependence between neighboring pixel values?

2.2.2:Spectral redundancy

Which is due to the correlation between different color planes or spectral bands?

2.2.3: Temporal redundancy

Which is present because of correlation between different frames in images?

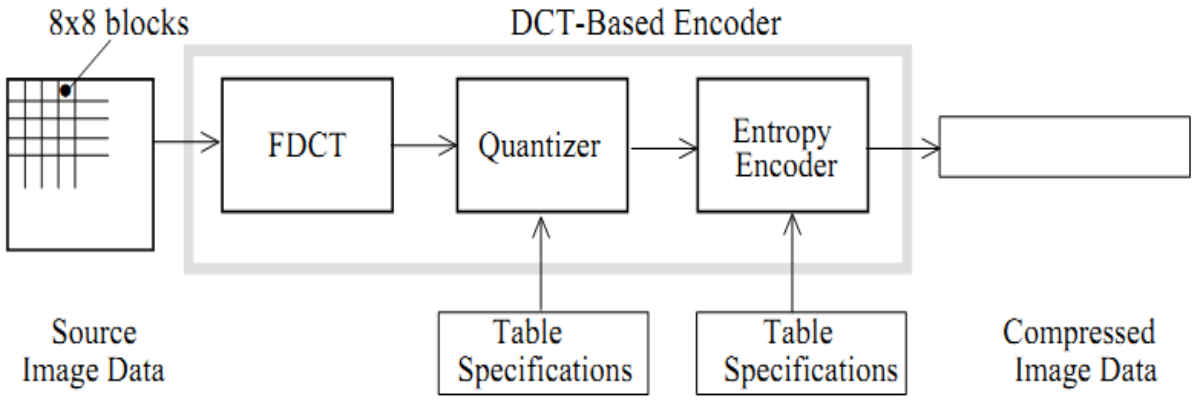

Fig (1) DCT Based Encoder

Some properties of practical FDCT and IDCT implementations raise the issue of what precisely should be required by the JPEG standard. A fundamental property is that the FDCT and IDCT equations contain transcendental functions. Consequently, no physical implementation can compute them with perfect accuracy.

Because of the DCT's application importance and its relationship to the DFT, many different algorithms bywhich the FDCT and IDCT may be approximately computed have been devised [2]. Indeed, research in fastDCT algorithms is ongoing and no single algorithm is optimal for all implementations.

DCT allows for custom quantization tables to be defined within the encoded file headers.

The quantization tables can be linear or non-linear. However, quantization is most effective when less important elements are quantized more coarsely.

III.Simulation Result

Result obtained after performing DCT of various orders on original images are shown. Fig (2.1) shows original images. Fig (2.2) show compressed images for the original Rose image after taking various numbers of coefficients for quantization. As the number of coefficients increases quality of the image decreases whereas compression ratio continues to increase. Larger quantization values will result in visual artifacts. Non-zero AC coefficients after quantization are worse for compression, but will suppress blocking artifacts in the reconstructed image. Blocking artifacts indicate high spatial frequencies caused by an absence of AC coefficientsEssentially, quantization, when used effectively, will result in high compression, with minimal loss in quality.

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Fig (2.1)Original Image of Rose

Fig (2.2) Gray image of Rose

IV.CONCLUSION

We have described how the discrete cosine and discrete wavelet transform can be used to compress remote sensing images. The reconstructed image quality of the two methods was compared using objective and subjective measures.

The performance criteria's MSE, PSNR and compression ratio changed according to the different regions due to their pixel classification

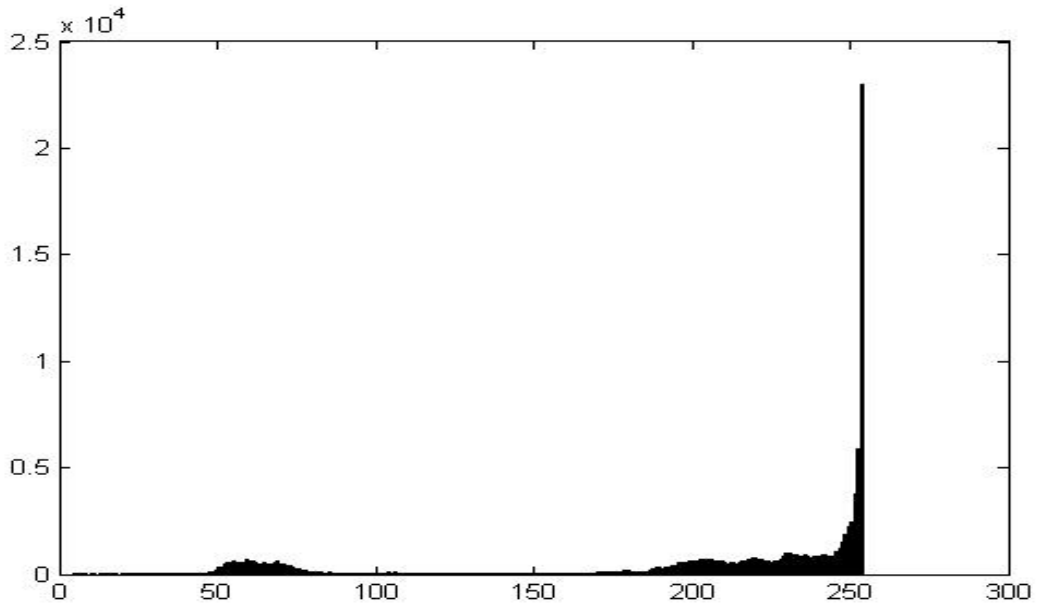

Fig (3) Histogram of error at 2-leveldecomposition

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