Wavelets: Applications to Image Compression-II

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We explain here, the wavelet based thresholding procedure, one of the key factors behind the successful application of wavelets in image compression. We then elaborate on quantization and go on to outline the basic ideas underlying Huffman coding, the other important tool for data compression.

Introduction

In the first part of this article [1], we have described in detail the origin of various kinds of redundancies in still images, which makes them amenable for compression [2,3]. We have also pointed out the advantages of wavelets over the earlier used discrete cosine transform. In this article, we describe the various steps in image compression like thresholding, quantization and entropy encoding. We describe the run-length coding, differential pulse code modulation and the most popular Huffman coding. These procedures take advantage of the different types of redundancies, for achieving compression of images. We start with the operation of thresholding.

Threshold

Once DWT is performed, the next task is thresholding, which is neglecting certain wavelet coefficients. For doing this one has to decide the value of a threshold and how to apply the same.

Value of the Threshold

This is an important step which affects the quality of the compressed image. The basic idea is to truncate the insignificant coefficients, since the amount of information contained in them is negligible.


Keywords

JPEG-2000, image compression, discrete wavelet transform (DWT), Donoho thresholding, Huffman coding.