Efficient and Accurate Implementation of Image Scaling in the Frequency Domain

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Abstract :  
Image scaling, particularly by powers of two, has previously been shown as implemented efficiently by direct manipulation of coefficients in the frequency domain. Typically, these coefficients are computed via the 8x8 DCT, or other block transforms, for their compressed storage in popular standard formats such as JPEG or MPEG. Many existing implementations of these image scaling algorithms use coarse fixed-point approximations for the floating point constants required by their definitions. This paper demonstrates application of a new methodology to approximate the floating point constants needed to perform scaling down of an image in the frequency domain. Our fixed-point implementation is a multiplierless and relatively precise (as shown by PSNR) implementation of the algorithm and is suitable for applications, such as high speed and high resolution color printing, where the visual quality of the resulting scaled image cannot be compromised.