An Enhanced Fast Iterative Blind Deconvolution Algorithm for Noiseless And Noisy Images

OMAR ELFAROUK MAMDOUH IBRAHIM FOUAD FAHMY ,M. F. Fahmy ; G. M. Abdel Raheem ; U. S. Mohammed

Abstract

Successful blind image deconvolution algorithms require the exact estimation of the Point Spread Function size, PSF. In the absence of any priori information about the imagery system and the true image, this estimation is normally done by trial and error experimentation, until an acceptable restored image quality is obtained. This paper presents an exact estimation of the PSF size, which yields the optimum restored image quality, for both noisy and noiseless images. It is based on evaluating the detail energy of the wave packet decomposition of the blurred image. The minimum detail energy occurs at the optimum PSF size. Having accurately estimated the PSF, the paper also proposes a fast double updating algorithm for improving the quality of the restored image. This is achieved by the least squares minimization of a system of linear equations describing some peak error deviations derived from the blurred image. Extension to the noisy case has also been investigated. Simulation results of several examples have verified that the proposed technique manages to yield a sharper image with higher PSNRthan classical approaches.
Keywords: Blind image deconvolution, image enhancement

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