In this study, reconstruction of clearer images using error optimization techniques was done. Minimization of noise from the image and the study of the performance of a combination of the Weiner Filter (WF) via the Least Mean Square (LMS) Algorithm and the Modified Decision Based Unsymmetrical Trim Median Filter (MDBUTMF). MATLAB 7.11.0 (R2010b) as a digital signal processing tool was used. The findings reveal that the WF-LMS algorithm fails to remove salt noise (zero valued pixels). These findings turn out to be a potential contribution of this study to the field of DSP in computational physics and optics. Several studies in multirate digital signal processing have not pointed this anomaly of WF-LMS algorithm in their work nor has it been published by any publishing institutions to the best of our knowledge. MDBUTMF performance was found to be better than WF-LMS at high noise variances. However, observations show that the resolution of the image with MDBUTMF decreases with increasing noise variances (NV). The results of the proposed method (a combination of WF-LMS and MDBUTMF) were found to be generally effective and superior compared to WF-LMS and MDBUTMF when used separately. The method therefore makes a potential contribution in improving restoration and
visibility of images. For qualitative evaluation and measurement, the Mean Average Error (MAE), Mean Square Error (MSE), Peak Signal to Noise Ratio (PSNR) and Signal to Noise Ratio (SNR) were used and the effectiveness of the filters increases in the order of WF-LMS, MDBUTMF and the proposed method. It is concluded that the generality that WF-LMS de-noises salt and pepper noise no longer applies. It is also concluded that the proposed method is superior compared to the WF-LMS and the MDBUTMF when used separately. It is then recommended that WF-LMS needs modification to de-noise the salt noise and thus the proposed method of combination of WF-LMS and the MDBUTMF.

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Index Terms

Computer Science Signal Processing

Keywords

Image Reconstruction; Weiner Filter; Signal Processing; Least Mean Square; Signal to Noise Ratio.