Abstract

Noise, poor image contrast, in homogeneity, weak boundaries and special marks existing in the mammogram images makes diagnosis procedure extremely difficult, so there are needs for a way to denoise those images while preserving their important features. The Adaptive bilateral filter sharpens an image by increasing the slope of the edges without producing overshoot or undershoot. Morphological operations such as dilation, erosion, opening and closing with appropriate structure element size are offering a quality Sharpening enhancement. The performance of the filter was improved by including the mathematical morphology operations along with adaptive bilateral filter process. The parameters of the Adaptive bilateral filter are optimized with an iterative algorithm. The proposed method was applied for mammogram images. The performance analysis of the filter with respective design parameters and metrics are compared with existed algorithm the results were judged by three metrics; mean square error (MSE), structure similarity index (SSIM) and peak signal to noise ratio (PSNR).

References
1. Bozek, J., Delac, K., & Grgic, M. (2008, September). Computer-aided detection and diagnosis of breast abnormalities in digital mammography. In ELMAR, 2008. 50th International Symposium (Vol. 1, pp. 45-52). IEEE.

2. Verma, R., & Ali, D. J. (2013). A comparative study of various types of image noise and efficient noise removal techniques. International journal of advanced research in computer science and software engineering, 3(10).

3. Zhang, B., & Allebach, J. P. (2008). Adaptive bilateral filter for sharpness enhancement and noise removal. IEEE transactions on Image Processing, 17(5), 664-678.

4. Reinhardt, J. M., & Higgins, W. E. (1996). Efficient morphological shape representation. IEEE Transactions on Image Processing, 5(1), 89-101.

5. Gonzalez, R. C., Woods, R. E., & Eddins, S. L. (2004). Digital Imaging Processing Using MATLAB.

6. Tomasi, C., & Manduchi, R. (1998, January). Bilateral filtering for gray and color images. In Computer Vision, 1998. Sixth International Conference on (pp. 839-846). IEEE.

7. Salembier, P., & Serra, J. (1995). Flat zones filtering, connected operators, and filters by reconstruction. IEEE Transactions on image processing, 4(8), 1153-1160.

8. Banerjee, I., Bhattacharyya, S., & Sanyal, G. (2013). Study and analysis of steganography with pixel factor mapping (PFM) method. International Journal of Application or Innovation in Engineering & Management (IJAEM), 2(8), 258-266.

9. Sampat, M. P., Wang, Z., Gupta, S., Bovik, A. C., & Markey, M. K. (2009). Complex wavelet structural similarity: A new image similarity index. IEEE transactions on image processing, 18(11), 2385-2401.

Index Terms

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Keywords

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