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A Review on Biomedical Image brightness preservation and segmentation technique using CLAHE and Wiener filtering

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Abstract: In biomedical image processing, low contrast image analysis is a challenging problem. Low contrast digital images reduce the ability of observer in analyzing the image. The most effective method used for contrast enhancement is Histogram Equalization (HE). Here propose a new method named "Biomedical Image brightness preservation and segmentation technique using CLAHE and Wiener filtering". . Here use CLAHE and Wiener filtering based techniques to enhance contrast of biomedical images. The contrast of an image is enhanced by applying CLAHE on small data regions called tiles rather than the entire image. Wiener filtering reduces the content of noise in histogram equalized image.

Keywords: Biomedical Image Enhancement, CLAHE, Wiener filtering, Contrast Enhancement.

I. INTRODUCTION

Contrast enhancement is an important area in the field of biomedical digital image processing for human visual perception and computer vision. Histogram Equalization (HE) method is one such technique used for contrast enhancement which improving visual quality of low contrast images [1].

Biomedical digital image enhancement is one of the most important images processing technology which is necessary to improve the visual appearance of the image or to provide a better transform representation for future automated image processing such as image analysis, detection, segmentation and recognition [2]. Many images have very low dynamic range of the intensity values due to insufficient illumination and therefore need to be processed before being displayed. This proved as a flexible and effective way for medical image enhancement and can be used as a pre-processing step for medical image understanding and analysis.

Image contrast enhancement techniques are of particular interest in photography, satellite imagery, medical applications and display devices. Producing visually natural is required for many important areas such as vision, remote sensing, dynamic scene analysis, autonomous navigation, and biomedical image analysis [3]. Histogram Equalization (HE) method is one such technique use to improve the brightness in image so that it will reduce the number of gray levels in image.

II. LITERATURE REVIEW

Wei Fan, Kai Wang, Franc¸ois Cayre, and Zhang Xiong [1] proposed an image variational deconvolution framework for both quality enhancement and antiforensics of median filtered images. The proposed optimizationbased framework consists of a convolution term, a fidelity term with respect to the median filtered image, and a prior term. The first term is for the approximation of the median filtering process, using a convolution kernel. The second fidelity term keeps the processed image to some extent still close to the median filtered image, retaining some denoising or other image processing artifact hiding effects.

Hongteng Xu, Guangtao Zhai, Xiaolin Wu, and Xiaokang Yang[3] proposed a generalized equalization model for image enhancement. Based on analysis on the relationships between image histogram and contrast enhancement/ white balancing, first establish a generalized equalization model integrating contrast enhancement and white balancing into a unified framework of convex programming of image histogram. They show that many image enhancement tasks can be accomplished by the proposed model using different configurations of parameters. With two defining properties of histogram transform, namely contrast gain and nonlinearity, the model parameters for different enhancement applications can be optimized.

Tarun Kumar Agarwal, Mayank Tiwari, Subir Singh Lamba[6] proposed a method named "Modified Histogram Based Contrast Enhancement using Homomorphic Filtering" (MH-FIL) for medical images. This method uses two step processing, in first step global contrast of image is enhanced using histogram modification followed by histogram equalization and then in second step homomorphic filtering is used for image sharpening, this filtering if followed by image normalization. To evaluate the effectiveness of method choose two widely used metrics Absolute Mean Brightness Error (AMBE) and Entropy.

David Menotti, Laurent Najman, Jacques Facon, Arnaldo de A. Araujo and Gisele L. Pappa [11] proposed two methodologies for fast image contrast enhancement based on histogram equalization (HE), one for gray-level images, and other for colour images. For gray-level images, they

propose a technique called Multi-HE, which decomposes the input image into several sub-images, and then applies the classical HE process to each one of them. In order to decompose the input image, we propose two different discrepancy functions, conceiving two new methods. Experimental results show that both methods are better in preserving the brightness and producing more natural looking images than other HE methods. For colour images, they introduce a generic fast hue-preserving histogram equalization method based on the RGB colour space, and two instantiations of the proposed generic method, using 1D and 2D histograms.

III. PROPOSED SYSTEM

With the fast advance of technologies and the prevalence of imaging devices, billions of biomedical digital images are being created every day. Due to undesirable light source, failure of the imaging device itself, the contrast and tone of the captured image may not always be satisfactory. Therefore, image enhancement is required. In medical image processing, low contrast image analysis is a challenging problem. Low contrast digital images reduce the ability of observer in analysing the image. Here use CLAHE and Wiener filtering based techniques to enhance contrast of biomedical images. These methods are use to find exact locations of cancerous regions and for low-dose CT images, these methods are use to intensify tiny anatomies like vessels, lungs nodules, airways and pulmonary fissures. Here propose a new method named "Biomedical Image brightness preservation and segmentation technique using CLAHE and Wiener filtering". In propose method, apply HE method for contrast enhancement on modified histogram i.e. Contrast Limited Adaptive Histogram Equalization (CLAHE), after that use wiener filtering for image sharpening and then to minimize the difference between input and processed image mean brightness. The method has the ability to control the level of contrast enhancement in the output image.

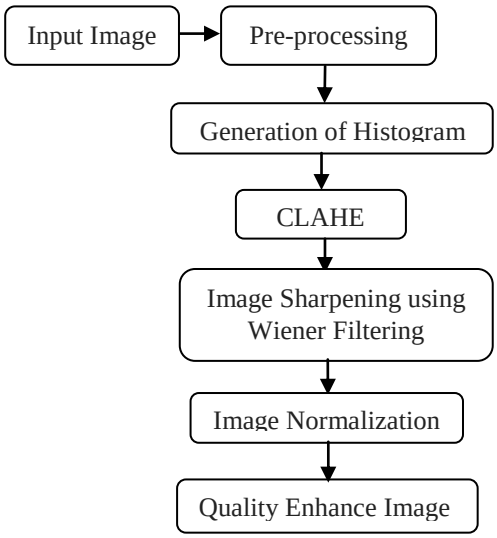

Fig. 1 Shows functional block diagram to preserve brightness and segmentation technique using CLAHE and Wiener filtering.

IV. CONCLUSION

The low contrast, nosy and blur images are enhanced by using different filtering techniques and contrast enhancement techniques. The CLAHE and Wiener filtering provides optimum contrast enhancement while preserving the brightness of given medical image and suitable for all types of medical images. Wiener filter is suitable for image sharpening and CLAHE is good for increase the contrast of the image. These methods help to doctors and radiologist for correct diagnosis of the desieses at an earliest.

REFERENCES

[1] Wei Fan, Kai Wang, Franc¸ois Cayre and Zhang Xiong, "Median Filtered Image Quality Enhancement and Anti-Forensics via Variational Deconvolution," IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY, pp. 1-16, 2015.

[2] Vikrant Bhateja, Gopal Singh, Atul Srivastava and Jay Singh, "Speckle Reduction in Ultrasound Images Using an Improved Conductance Function Based on Anisotropic Diffusion," International Conference on Computing for Sustainable Global Development (INDIACom), pp. 619-624, 2014.

[3] Hongteng Xu, Guangtao Zhai, Member, Xiaolin Wu, Fellow, and Xiaokang Yang, "Generalized Equalization Model for Image Enhancement," IEEE TRANSACTIONS ON MULTIMEDIA, VOL. 16, NO. 1, pp. 68-82, 2014.

[4] Gagandeep Singh and Sarbjeet Singh, "An Enhancement of Images Using Recursive Adaptive Gamma Correction," Gagandeep Singh et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 6 (4) , pp. 3904-3909, 2015.

[5] Aziz Makandar and Bhagirathi Halalli, "Breast Cancer Image Enhancement using Median Filter and CLAHE," International Journal of Scientific & Engineering Research, Volume 6, Issue 4, pp. 462-465, 2015.

[6] Tarun Kumar Agarwal, Mayank Tiwari and Subir Singh Lamba, "Modified Histogram Based Contrast Enhancement using Homomorphic Filtering for Medical Images," International Advance Computing Conference (IACC), pp. 964-968, 2014.

[7] Mandeep Kaur and Ishdeep Singla, "A Dualistic Sub-Image Histogram Equalization Based Enhancement and Segmentation Techniques with NN for Medical Images," Research Inventy: International Journal Of Engineering And Science Vol.05, Issue 01, PP: 15-19, 2015.

[8] Oakar Phyo and AungSoe Khaing, "AUTOMATIC DETECTION OF OPTIC DISC AND BLOOD VESSELS FROM RETINAL IMAGES USING IMAGE PROCESSING TECHNIQUES," IJRET: International Journal of Research in Engineering and Technology, Volume: 03 Issue: 03, pp. 300-307, 2014.

[9] Chahat Chaudhary and Mahendra Kumar Patil, "REVIEW OF IMAGE ENHANCEMENT TECHNIQUES USING HISTOGRAM EQUALIZATION," International Journal of Application or Innovation in Engineering & Management (IJAIEM), Volume 2, Issue 5, pp. 343-349, 2013.

[10] Omprakash Patel, Yogendra, P. S. Maravi and Sanjeev Sharma, "A COMPARATIVE STUDY OF HISTOGRAM EQUALIZATION BASED IMAGE ENHANCEMENT TECHNIQUES FOR BRIGHTNESS PRESERVATION AND CONTRAST ENHANCEMENT," Signal & Image Processing: An International Journal (SIPIJ), Vol.4, No.5, pp. 11-25, 2013.

[11] David Menotti, Laurent Najman, Jacques Facon, Arnaldo de A. Araujo and Gisele L. Pappa, "Contrast Enhancement in Digital Imaging using Histogram Equalization," Phd thesis, submitted to the Department of Computer Science, UFMG- Universidade Federal de Minas Gerais, 2008.

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