Review of Biomedical Image Based on Transform Function And Neural Network

Rajendrasingh Ramanand Rajput[1], Prof. Ravindra Gupta[2]
[1, 2] Dept of Computer Science and Engineering
[1, 2] RKDF College (RGPV University), Bhopal, India

Abstract- *The Medical Images normally have a problem of high level components of noises. There are different techniques for producing medical images such as Echocardiographic Images, X-ray, Computed Tomography and Ultrasound, during this process noise is added that decreases the image quality and image analysis. Image enhancement is an important task in image processing, use of spectral subtraction improves the quality of an image and reduces noise level. Noise reduction is an important step for any complicated algorithms, in computer vision and image processing. DE noising is necessary and the initial step to be taken prior to the image data is analyzed. It is essential to apply an efficient enhancement technique, to compensate such data corruption. The effort of image enhancement is to improve an image that is cleaner than its noisy observation. Therefore, a substantial technology in image analysis is noise reduction and the initial step to be taken prior to images is analyzed.*

Keywords- DIGITAL IMAGE, IMAGE ENHANCEMENT, SOM, DWT, PSNR.

I. INTRODUCTION

Digital images are often corrupted by noise during their acquisition and transmission. A fundamental challenge in image enhancement is to reduce noise while maintaining the desired image features such as edges, textures, and fine details. An enhancement process is normally applied to digital images to obtain more information or details contained in the images [1-3]. This process is very useful for consumer electronic products which the process is normally applied in preprocessing and post processing stages. However, most recorded images are poor in contrast and having non-uniform illumination. These conditions occur due to the insufficient lighting sources and improper focusing during the image acquisition process. Insufficient illumination makes the brightness in the image unevenly distributed. Thus, image enhancement has been employed to improve the interpretability or perception of information in images. In addition, it provides better input images for further processing tasks [11-12]. In particular, there are two common types of noise namely Gaussian noise and Impulse noise, which are introduced during the acquisition and transmission processes. Noisy images can be found in many applications. Noise is also introduced in digital images, when a damaged image is scanned. Digital cameras may introduce noise because of CCD sensor malfunction, electronic interference orflaws in data transmission. In the last two decades, many methods have been introduced in the literature to remove either Gaussian or Impulse noise [4-5]. In the rest part of this paper we discussed the previous work in II section. In the IIIrd and IVth section we have to describe problem formulation and Wavelet Transform Function Sequencially.Finally we discuss about its conclusion and future work.

II. PREVIOUS WORK DONE

Yi Niu, Xiaolin Wu, Guangming Shi Et al. [1] this article introduces a new contrast enhancement algorithm of tone-preserving entropy maximization. Its design objective is to present the maximal amount of information content in the enhanced image, or being optimal in an information theoretical sense, while preventing the loss of tone continuity. The resulting optimization problem can be graph theoretically modeled as the construction of the K-edges maximum-weight path, and it can be solved efficiently by dynamic programming.

ParisaGifani, Hamid Behnam, FarzanHaddadi, Zahra AlizadehSani, and Maryam Shojaeifard Et al. [2] they introduce a novel framework that optimizes TSR enhancement of echo cardio-graphic images by utilizing temporal information and sparse representation. The goal of this method is to increase the frame rate of echo cardio-graphic videos, and therefore enable more accurate analyses of moving structures. For the discussed method, they first derived temporal information by extracting intensity variation time curves (IVTCs) assessed for each pixel. They then designed both low-resolution and high-resolution over complete dictionaries based on prior knowledge of the temporal signals and a set of pre-specified known functions. The IVTCs can then be described as linear combinations of a few prototype atoms in the low-resolution dictionary. They used the Bayesian compressive sensing (BCS) sparse recovery algorithm to find the sparse coefficients of the signals.

Laurent Navarro, Guang Deng and Guy Courbebaisse Et al. [3] in this implement a new extension of logarithmic image processing (LIP) model, called Symmetric Logarithmic Image Processing (SLIP) are discussed. Inspired by the previously developed symmetric models, the SLIP model defines a vector space on a symmetric bounded set. The development is aimed at (1) maintaining the physical interpretation of the LIP model and (2) solving the potential out-of-range problem which the LIP model has. The SLIP model is also able to deal with transmitted and reflected light images.

V. Murugan, R. Bala-subramanian Et al. [4] they defined to a novel method which removes Gaussian noise from the gray scale images. The discussed technique is compared with Enhanced Fuzzy Peer Group Filter (EFPGF) for various noise levels. Experimental results proved that the discussed filter achieves better Peak-Signal-to-Noise-Ratio PSNR than the existing techniques. The discussed technique achieves 1.736dB gain in PSNR than the EFPGF technique. This implement discusses an efficient technique for removing Gaussian noise in gray scale images.

KhairunnisaHasikin, Nor Ashidi Mat Isa Et al. [5] this implement presents the fuzzy image enhancement for low contrast and non-uniform illumination images. A new fuzzy intensity measure is discussed to distinguish between the dark and bright regions. This measure is computed by considering the average intensity and deviation of the intensity distribution of the image. The input image is enhanced using a power-law transformation. Implementation of the discussed algorithm on the non-uniform illumination and low contrast images show that the discussed algorithm outperforms the other enhancement techniques.

Tao Huang, Yan Liu, TongweiRen, Lei Huang, JiaBei, Qin Liu Et al. [6] they discuss a novel tone mapping approach based on edge preserved dithering, which makes use of high resolution of display screen to break through the gray scale limitation. To each HDR image, they first decompose its L∗ component to the ditherable patches and the unditherable patches. Then, they utilize linear programming to tone map the mean gray levels of the ditherable patches and the gray level of each pixel in the unditherable patches to an extended dynamic range. Finally, the gray levels of the tone mapped image are further narrowed to the required gray scale of display screen in which dithering is applied on ditherable patches.

K. Sujatha, D. ShaliniPunithavathani, LallawmzualaKhawlhring Et al. [7] in this implement a thorough analysis is carried out with 31 TMO operators. Existing study implements are up to maximum of 8 TMOs, but this implement evaluates all the 31 operators and the objective quality measure is calculated. Researchers are carried out to identify a better operator for its own applications, which motivated to do this implement, the resultant analysis provokes to the development of a new method with lesser computational time. This work can be further extended to optimization of the algorithm used in fusion of base and detail layers of sequence of input.

ShibudasKattakkalilSubhashdas, Bong-Seok Choi, Ji-HoonYoo, Yeong-Ho-Ha Et al. [8] this implement discuss a Gaussian mixture based image enhancement method which uses particle swarm optimization (PSO) to have an edge over other contemporary methods. The discussed method uses the guassian mixture model to model the lightness histogram of the input image in CIEL space. The intersection points of the guassian components in the model are used to partition the lightness histogram. . The enhanced lightness image is generated by transforming the lightness value in each interval to appropriate output interval according to the transformation function that depends on PSO optimized parameters, weight and standard deviation of Gaussian component and cumulative distribution of the input histogram interval.

Wan NuralJawahirHj Wan Yussof, Muhammad SuzuriHitam, EzmahamrulAfreenAwalludin, ZainuddinBachok Et al. [9] This implement describes method to improve the visibility of underwater images. Using Contrast Limited Adaptive Histogram Equalization (CLAHE) technique, their method derives the enhanced image from combination of outputs performed on RGB color model and HSV color model that is done through Euclidean norm. The underwater images for this study were taken from Redang Island and Bidong Island in Terengganu, Malaysia. Experimental results indicate that the discussed method significantly improves the visual quality of underwater images by enhancing contrast, as well as reducing noise and artifacts.
S. Brindha Et al. [10] The aim of this project is to enhance the contrast of the satellite image using Discrete Wavelet Transform (DWT) and Singular Value Decomposition (SVD) and segment the images by using the model Multi Region Resolution (MRR) and Markov Random Field (MRF). The image enhancement is a process of improve the quality of an image. One of the most important quality factors in satellite images comes from its contrast. Contrast enhancement is one of the most important problem in image processing. Contrast is developed by the difference in luminance reflected from two adjacent surfaces. Contrast is the difference in the color and brightness of the image.

Gouri B. Deshpande and Dr. K. Ramesha Et al. [11] This implement presents a novel method of enhancing the

image quality of human brain obtained from Magnetic Resonance Imaging scans. Here, they are trying to enhance the brain image using Xilinx System Generator, which is a DSP tool devised by Xilinx Corporation. The architecture presented in this implement utilizes a graphical user interface that bands together MATLAB Simulink and XSG offering appropriate hardware implementation. Hence, the quality of image is improved. These images are, then, fed to artificial neural network, for normality or abnormality classification of brain. This implement utilizes ANN using multi-perceptron and back propagation method. This method first makes use of discrete wavelet transform to extract energy values from enhanced images using filters and then it is fed to ANN for further classification.

B. Sridhar, Dr. K. V. V. S. Reddy Et al. [12] in this implement, they present the performance analysis of adaptive bilateral filter by pixel to noise ratio and mean square errors. It was evaluate changing the parameters of the adaptive filter half width values and standard deviations. In adaptive bilateral filter, the edge slope is enhanced by transforming the histogram via a range filter with adaptive offset and width. The variance of range filter can also be adaptive. The filter is applied to improve the sharpens of a gray level and color image by increasing the slope of the edges without producing overshoot or undershoots. The related graphs were plotted and the best filter parameters are obtained. This implement examines the performance of the bilateral filtering, a recent approach discussed that represents the optimum parameter to chosen to get restored image form the robust image. In this implement, they present the adaptive bilateral filter for sharpness enhancement and noise removal. The adaptive bilateral filter sharpens an image by increasing the slope of the edges without producing overshoot or undershoots.

III. PROBLEM FORMULATION

The basic idea behind this thesis is the estimation of the uncorrupted image from the distorted or noisy image, and is also referred to as image "denoising". There are various methods to help restore an image from noisy distortions. Selecting the appropriate method plays a major role in getting the desired image. The denoising methods tend to be problem specific. For example, a method that is used to Denoise. Satellite images may not be suitable for denoising medical images. Each method is compared and classified in terms of its efficiency. In order to quantify the performance of the various denoising algorithms, a high quality image is taken and some known noise is added to it. This would then be given as input to the denoising algorithm, which produces an image close to the original high quality image. The performance of each algorithm is compared by computing Signal to Noise Ratio (SNR) besides the visual interpretation. Also we find in general problem in image denoising process used wavelet transform and artificial neural network model.

- The medical image has more noise.
- The neighborhood smoothing method: Using the average gray value of the pixel and its neighborhood look upon as the gray value of the pixel, this method is simple, but it will make the image blurred boundaries. Therefore, in order to better image denoising. After some research denoising algorithm. Proposed a threshold based on digital image denoising hybrid algorithms. It has several features:
- Bad PSNR in images of rich textures and higher visual quality in the region of texture area.
- Difficult to design adaptable size of coded blocks according to the level of wavelet packet decomposition.

IV. WAVELET TRANSFORM FUNCTION

The transform function plays an important role in digital image enhancement. In family of transform function gives one member is called fractal transform function. But in this work fractal transform function work as lossless image compression. The transform function used the property of similarity. The property of similarity index combined the data in from of processing in terms of compression. On the whole, the FACTRAL algorithm makes full use of the characteristics of wavelet coefficients involving the energy clustering and the energy attenuation along with the increase of scalability[7-8]. Furthermore, buying combining the quad tree partition with the bit-plane encoding, this method can nearly achieve the same compressing performance with the SPIHT. However, there still exists some improvement to be done as for the achieving speed and memory usage in spite of its Coding independently, fast coding speed and so on. First we define a significance test for coefficients[13-14].

When the outcome of the test is 1, we say the set is significant for the current threshold n, otherwise it is insignificant.

$$x(s,t)= \sum_{k,i=0}^{Nrl} uJ,k,i\ LLJ,k,i(s,t)+ LL \sum_{EEBj=lk,i=0}^{N-1} wEJ,k,i\,jfEJ,k,;(s,t) \quad \text{.....(1)}$$

with

$$LLj,k,i(s,t)=rJl2\ (rjs-k,rJt-i),\ jfEJ,k,i(s,t),jfEJ,k,i(s,t)$$
$$=ri^{12}jfE(rJs-k,rit-i),BEB,B \quad \text{.....(2)}$$

{LH, HL, HH},andNJ=NI2J. In this paper LH, HL and HH are called wavelet or DWT sub-bands. uJ,k,i=**JJ**x(s,t) J.k,;dsdt is a scaling coefficient and wEJ, k, I = **JJ** x (s,{wEJ,k,; dsdt denotes the(k,i)th wavelet coefficient in scale j and sub-band B. Figure shows the scaling concept in wavelet transform.

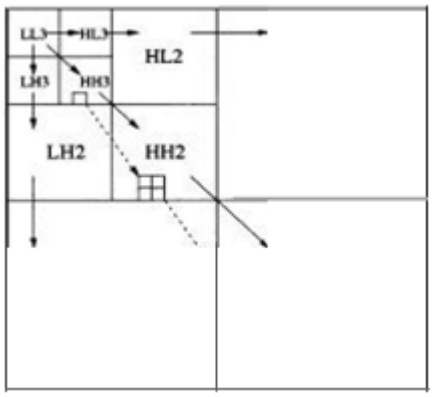

Figure 1: Frequency domain analyses during feature extraction process.

V. CONCLUSIONS & FUTURE WORK

In this dissertation a hybrid of enhancement method based on wavelet transform function and neural networks is proposed. SOM were used to find correlation between noised and original DWT coefficients and approximation. Experimental results showed capability of proposed method to remove noise in terms of PSNR and visual quality. Different architectures and different activation functions is considered. The experimental results show the mean with the traditional enhancement methods, the proposed threshold-based enhancement digital image enhancement algorithm for mixed digital image enhancement is relatively clear, especially in the more noise, more complex cases", can show its good performance. In future we used optimizations method for the reduction of time and improvement of quality of image.

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