Analysis of Image Enhancement Technique Using Distributed Channel Filter and Particle of Swarm Optimization

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Abstract
Image enhancement is an important task in image processing, use of wavelet transform improves the quality of an image and reduces distortion level. Image enhancement is an important step for any complicated algorithms, in computer vision and image processing. Denoising 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 distortion observation. In this paper we proposed a hybrid method for image enhancement for improvement of image analysis. The process of raw image gets the high component value of noise in environment. For the reduction of these noise used wavelet domain method. The wavelet method is well recognized method for voice noise reduction. In wavelet method the local noise component value are not considered. Then after the enhancement process noise are still remain in raw image. For these low components value collection used genetic algorithm. And finally used PCNN. Our empirical evaluation shows that better result in compression of HE and MHE method. The HE method is generic method of image enhancement. The channel method is adaptive method for image enhancement.

Keywords: - Image, Noise, Neural network.

INTRODUCTION
Digital images play an important role both in daily life applications such as satellite television, magnetic resonance imaging, computer tomography as well as in areas of research and technology such as geographical information systems and astronomy. The image enhancement is an important technique that can improve the quality of the degraded image and offer some interesting image features selectively. Image enhancement is basically improving the interpretability or perception of information in images for human viewers and providing better input for other automated image processing techniques. The main objective of image enhancement is to modify attributes of an image to make it more suitable for a given task and a specific spectator. For the duration of this process, one or more characteristic of the image are customized [2]. The alternative of attributes and the way they are customized are specific to a given problem. Moreover, observer-specific factor, such as the person visual system and the observer's experience, will bring in a great deal of subjectivity into the choice of image enhancement methods. There exist many methods that can enhance a digital image without spoiling it. Image enhancement improves the quality (clarity) of images for human presentation. Eliminating blurring and noise, increasing contrast, and enlightening details are examples of enhancement operations [3]. For example, an image might be chosen of an endothelial cell, which may be of low contrast and little blurred. Decrementing the noise and blurring and incrementing the contrast range could enhance the image. The real image might have areas of very high and very near to the ground intensity, which facade details. An adaptive enhancement algorithm un-hides these

details. Adaptive algorithms correct their operation based on the image information (pixels) which is processed. In this scenario the mean intensity, contrast, and sharpness (amount of blur removal) could be adjusted based on the pixel intensity statistics in various areas of the image. A very popular technique for contrast enhancement of images is Histogram Equalization (HE), which is simple and has good performance compared to nearly all types of images. Histogram Equalization performs its operation by remapping the intensity levels of the image based on the probability distribution of the input intensities. Various researches have been performed on Histogram Equalization, and many methods have already been proposed. Usually, these techniques are classified into two principle categories; global and local Histogram Equalization. Global Histogram Equalization (GHE) uses the histogram information of the entire input image for its transformation. Image transform is a mathematical tool which is used in image processing and image analysis for detecting the rough or unclear area and solves it. Image transformation allows us to move from frequency domain to time domain to perform the task at hand in an easier manner. There are different types of image transform such as Fourier Transform, Walsh Transform, Hadamard Transform, Stant Transform and Wavelet Transform. There are various applications of neural networks in image processing and discuss the present and possible future role of neural networks, especially feed-forward neural networks, Kohen feature maps and Hop1eld neural networks. A large no of applications are categorized into a novel two-dimensional taxonomy for image processing algorithms. One dimension specifies the type of task performed by the algorithm: preprocessing, data reduction/feature extraction, segmentation, object recognition, image understanding and optimization. Techniques from statistical pattern recognition have, as the revival of neural networks, obtained an extensive use in digital image processing. Section II discusses about image enhancement techniques, Section III discusses problem statemnet. Section IV discusses Proposed method. And Section V discusses comparative result analysis. Finally, concluded in section VI.

II IMAGE ENHANCEMENT TECHNIQUES

WAVELET TRANSFORM METHOD

Wavelet transform basically two types one is continuous wavelet transform and another is discrete wavelet transform. Wavelet transforms have been one of the important signal processing developments in the last decade, especially for the applications such as time-frequency analysis, data compression, segmentation and vision. During the past decade, several efficient implementations of wavelet transforms have been derived. The theory of wavelets has roots in quantum mechanics and the theory of functions though a unifying framework is a recent occurrence. Wavelet analysis is performed using a prototype function called a wavelet. Wavelets are functions defined over a finite interval and having an average value of zero. The basic idea of the wavelet transform is to represent any arbitrary function f (t) as a superposition of a set of such wavelets or basis functions. These basis functions or baby wavelets are obtained from a single prototype wavelet called the mother wavelet, by dilations or contractions (scaling) and translations (shifts). Efficient implementation of the wavelet transforms has been derived based on the Fast Fourier transform and short-length fast-running FIR algorithms in order to reduce the computational complexity per computed coefficient. All wavelet packet transforms are calculated in a similar way. Therefore we shall concentrate initially on the Haar wavelet packet transform, which is the easiest to describe. The Haar wavelet packet transform is usually referred to as the Walsh transform.

DCF (Distributed Channel Filter)

The DCF model estimate intensity difference between two pixels in the image through contrast pairs, which are similar to those proposed by jen. A contrast pair acts like a force that spreads apart the intensities that define it. We model the interaction of the contrast pairs as a LCI function. Consequently, we define a contrast pair ij between two given intensities i and j as a set of votes for every intensity in the intensity set {i,..., j}. Moreover, we can consider the contrast pair ρij to be a vector of intensities whose length is equal to the intensities that has ones (votes) in the set {i,..., j} and zeros anywhere else, similar to the vectors shown in below figure. Spatially, the contrast pairs are constructed from the image using the eight neighbors of each pixel. They define the set of contrast pairs for a pixel (x, y). To create the transformation functions, we use the LCI from the contrast pairs. Unlike Jen, they use only the normalized LCI to compute the transformation function because we found that the channel division provides more enhancement than the proposed method by Jen et al. Consequently, the LCI in the proposed model is the accumulation of the vote's defined by the contrast pairs. In addition, we focus on the edge contrast pairs because their accumulation determines the transformation needed to reveal the details of the image. The LCIs produce different slopes according to their accumulation. Hence, when there is a high accumulation of contrast pairs, a steep slope is generated in the transformation function, and the intensities are spread farther apart. In contrast, when there is a small accumulation, the slope is close to the identity function, which maintains the intensities throughout the transformation. This procedure also preserves the aspect of the flat regions by ignoring the contribution of the smooth contrast pairs in the transformation. Hence, those intensities are not separated, which maintains the appearance in the flat regions.

III PROBLEM FORMULATION

In the process of review we found that some performance affected problem related to the image enhancement techniques. The basic idea behind in this paper is the estimation of the uncorrupted image from the distorted or noisy image, and is also referred to as image "enhancement". 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 enhancement methods tend to be problem specific. For example, a method that is used to denoise. Satellite images may not be suitable for enhancement medical images. Each method is compared and classified in terms of its efficiency. In order to quantify the performance of the various enhancement algorithms, a high quality image is taken and some known noise is added to it. This would then be given as input to the enhancement 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 denosing process used wavelet transform and artificial neural network model.

- ❖ The mean template approach: The original gray value of one pixel and its surrounding neighbouring pixel gray value are divided by the sum of these pixels, the average value will be the gray value of the corresponding pixel of new image. This method has the advantage: not only easy to understand, and computation easy, suitable for small image and noise less situation. But when the image is larger and more noise, the use of the mean template and cannot effectively remove the noise, and the average operation, will have some degree of blurred images.
- ❖ 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 enhancement. After some research enhancement algorithm. Proposed a threshold based on digital image enhancement hybrid algorithms. It has several features:
- ❖ DCF function not distribute lower pixel content channel.

- Very difficult to collect lower content of image using channel distribution.

IV PROPOSED METHODOLOGY

In this section we discuss image enhancement methodology based on DCF function and particle of swarm optimization. The DCF function distributes the all data in the form of channel in terms of matrix. The image features are extracted from the image using DCF function. POS acts as a clustering mechanism that projects N-dimensional features from the DCF function into an M-dimensional feature space. The resulting vectors are fed into a POS that categorizes them onto one of the relearned damage pixel classes. The proposed scheme is work along with particle of swarm algorithm. The particle of swarm algorithm process the collection task of local intensity of image data. The collected damage pixel value combined with high intensity image value and generates vector value for the process. They mapped features from each frame of the word onto the POS output to form a trajectory of winner nodes for a given word. The POS learns this trajectory for each damage pixel constraints value is comprised of a hierarchical organization of POS and POS. POS receives inputs from the DCF function bank and maps onto an M-dimensional space where M is the dimensionality of the POS output node distribution. The transformed feature vectors are fed into the POS, which classifies them. We call the feature space generated from the DCF function output as primary feature space and M-dimensional feature space from POS output as secondary feature space. The vectors from the secondary feature space are called secondary feature vectors.

PROCESSING OF PROPOSED ALGORITHM

Step 1. Initially input image passes through DCF function and decomposed into channel

Step 2.the all channel measure different intensity value.

Step 3. The collection of lower intensity value used particle of swarm algorithm

Step 4. Particle of swarm algorithm collects the local damage pixel value after that combined with high intensity value.

Step 5. After collecting total damage pixel value convert into feature vector image data passes through self filter

Step 6. In phase of feature mapping in feature space of POS network create a fixed cluster according to threshold of details of image part.

Step 7. Here show steps of processing of POS algorithm

1) Initialize each pixel as particle
2) Choose a random vector from to the POS.
3) Measure the velocity of difference in two particles.
4) The particle of the neighborhood around the Gbest is calculated. The size of the neighborhood decreases with each iteration.
5) Repeat from step 2 for enough iteration for convergence.
    1) Calculating the P best is done according to the Euclidean distance among the pixel.
    2) This gives a good measurement of how similar the two sets of data are to each other.

Step 8. After processing of POS out data of image is also passes through

Step 9. Finally gets enhanced image and measure value of PSNR.

PROPOSED MODEL

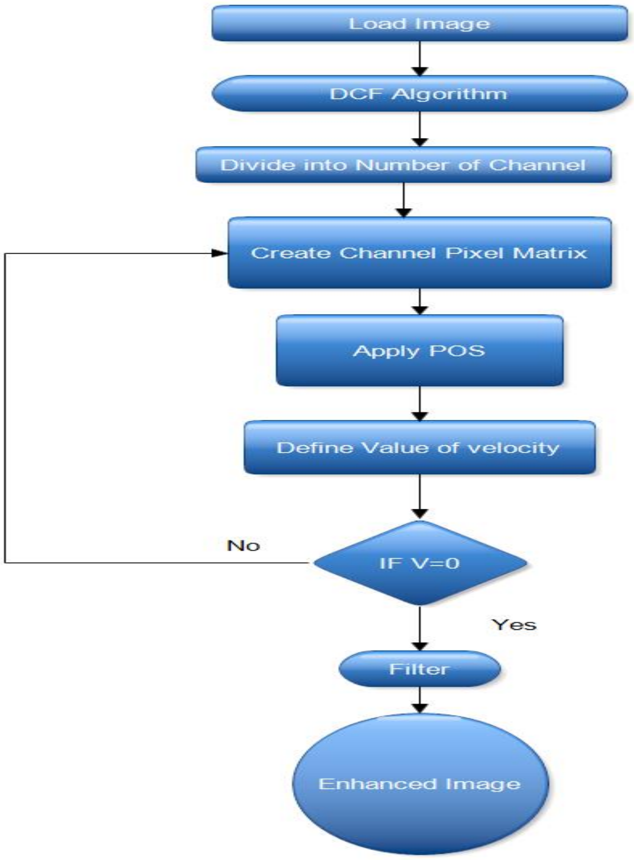

Figure 1: proposed Model of our Algorithm.

V EXPERIMENTAL ANALYSIS

In this section discuss the comparative result analysis of pervious algorithm used for the performance evaluation of histogram equalization, DCF and Proposed method for Cameraman, Medical image 1, Medical image 2 and Barbara image. This all image is gray scale image size is 512 * 512 Histogram equalization is basic method for image enhancement. The performance measuring parameter is PSNR. Here we use various types of image enhancement techniques such as ME, MHE, DCF and Proposed Method.

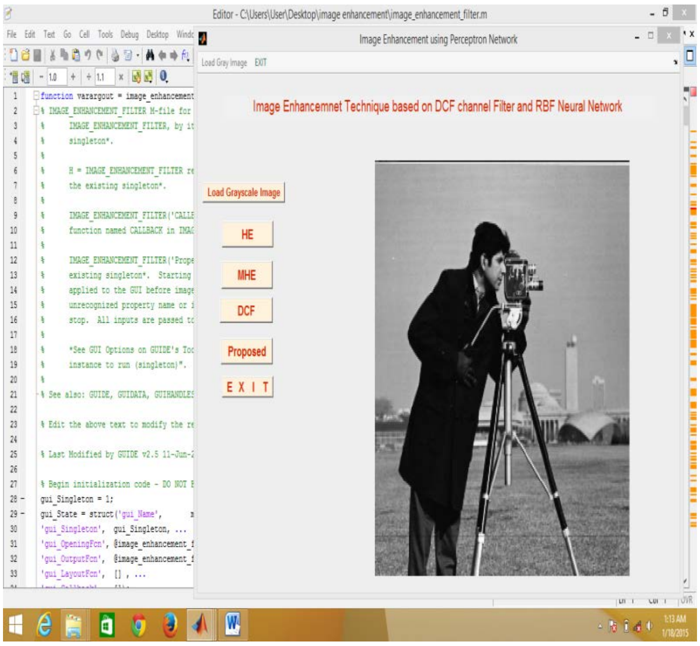

Figure 2: Shows that the initially load the gray scale image of camera man.

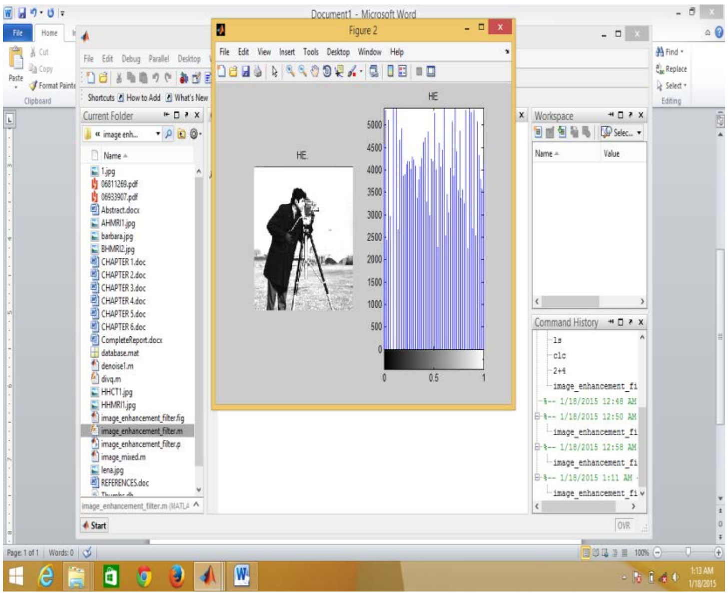

Figure 3: Shows that the image histogram with using HE methods. With PSNR Value: 15.60.

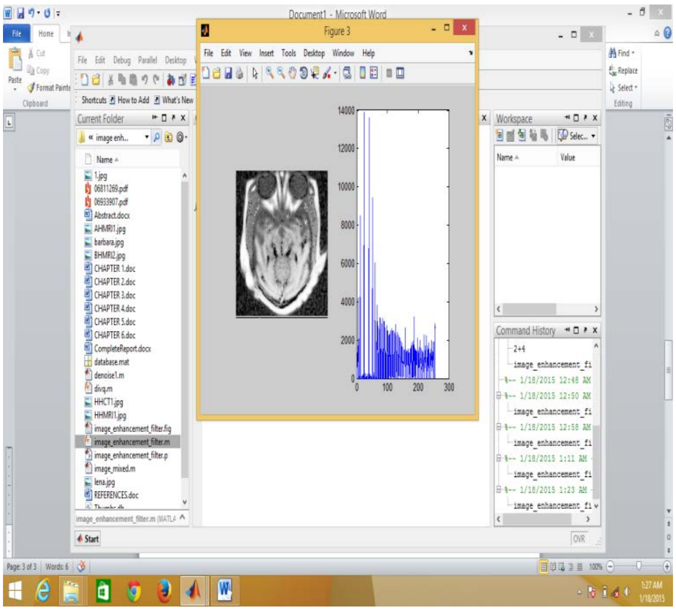

Figure 4: Shows that the image histogram with using MHE methods. With PSNR Value: 33.59.

IMAGE	PSNR (HE)	PSNR (MHE)	DCF	PROPOSED METHOD
CAMERA MAN	15.60	17.45	18.72	34.06
MEDICAL IMAGE 1	30.04	33.59	36.05	65.59
MEDICAL IMAGE 2	37.31	41.73	44.78	81.48
BARBARA	11.96	13.38	14.35	26.12

Table 1: Shows that the Comparative result with performance evaluation parameter for different no. of images with using image enhancement techniques.

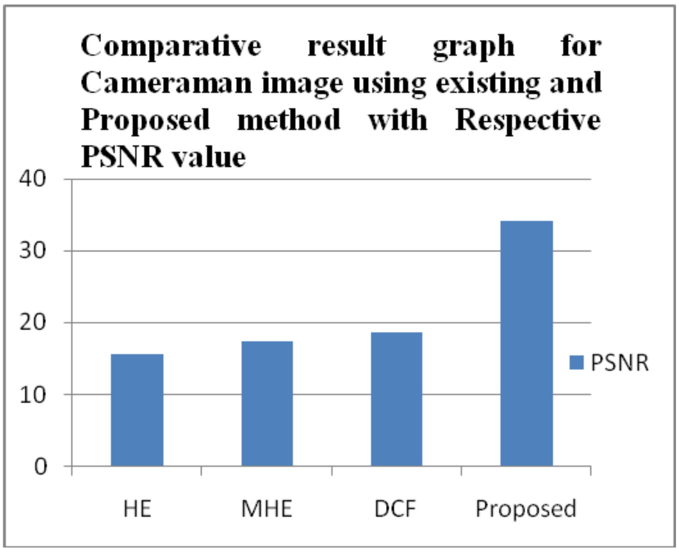

Figure 5: Shows that the comparative result graph for Cameraman images with using existing and our proposed method and here proposed method show that the better result than existing method for the PSNR as a performance parameter. The PSNR value of our method is 34.06.

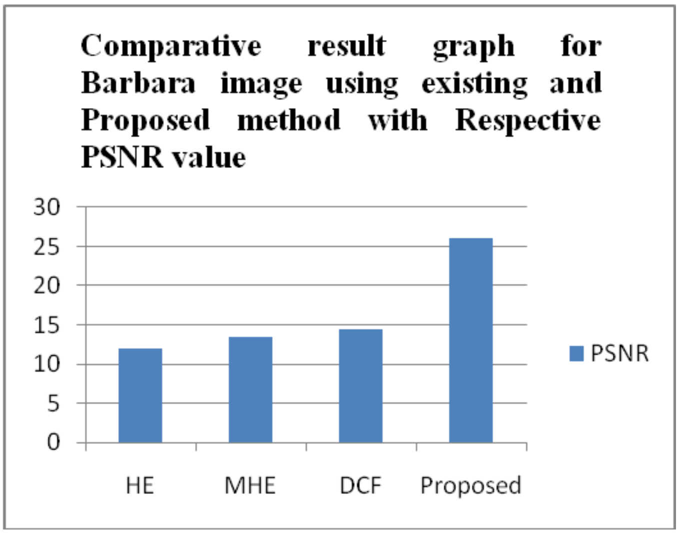

Figure 6: Shows that the comparative result graph for Barbara images with using existing and our proposed method and here proposed method show that the better result than existing method for the PSNR as a performance parameter. The PSNFR value of our method is 26.12.

VI CONCLUSION AND FUTURE WORK

In this paper an image enhancement technique using DCF and POS method based on channel filtration technique for image enhancement. POS were used to find correlation between damage pixel and original channel coefficients. Experimental results showed capability of proposed method to remove damage pixel 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 damage pixel, more complex cases, can show its good performance. In this paper we proposed a hybrid method for image enhancement for normal image. Our experimental result shows that better result in compression of old and traditional method of image enhancement. But the computational time of process is increase. In future we used optimizations method for the reduction of time and improvement of quality of image.

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