A Review of Image Enhancement Methods Using Soft Computing Technique

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Abstract- Soft computing and swarm intelligence play an important role in the image enhancement process. The soft computing offers different algorithm such as a differential evolution algorithm, genetic algorithm and many more algorithms directly used for the enhancement process. Now a day's various authors used neural network and hybrid neural network model for the process of image enhancement. 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 this paper we focus on the brief literature survey work for a image enhancement techniques for improve the quality of image and analysis of image.

Keywords: -HE, GHE, Image Enhancement, PSO, SNR.

I. INTRODUCTION

Image degradation is inevitable during the transmission and alteration of images. For example, the quality of an image shot by a camera is sometimes low due to the distortion of camera's optics scheme, the relative motion of the photographed object and the camera, the ecological change and the arbitrary disturbance. The image enhancement is an important technique that can improve the quality of the degraded image and offer some interesting image features selectively [3]. 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.

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 [8]. For example, an image might be chosen of an endothelial cell, which may be of low contrast and little blurred [2]. 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. Adaptive enhancement algorithms unhide 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 [5]. 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. Though this worldwide approach is appropriate for overall enhancement, it fails to adapt the local brightness features of the input image and shifts the mean intensity to the middle intensity level, apart from the input mean intensity [9].

The enhancement methods can generally be divided into the following two categories first one is Spatial Domain Methods and second is Frequency Domain Methods. In spatial domain techniques, we directly deal with the image pixels. The pixel values are computed to accomplish most wanted enhancement [7]. In frequency domain methods, the image is first transferred in to frequency domain so that Fourier Transform of the image is computed at first. All the enhancement operations are performed on the Fourier transform of the image and then the Inverse Fourier transform is performed to get the desired image. These enhancement operations are performed in order to adjust the image brightness, contrast or the distribution of the grey levels [12]. As an effect the pixel value i.e. intensities of the output image will be customized according to the transformation function applied on the input values. Image enhancement is applied in every area where images are ought to be understood and analyzed. As examples, medical image analysis, satellites images analysis etc.

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 [14]. 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. Initially, problems of pattern recognition were often solved by linear and quadratic discriminates or the (non-parametric) k-nearest neighbor classifier and the Parzen density estimator [11].

The rest of this paper is organized as follows. In Section II describe about the literature review in the field of image enhancement and techniques for better improvement the image quality, and in The Section III shows the problem statement and states the problem in brief and finally section IV discusses conclusion and future work.

II. RELATED WORK

This section gives an extensive literature survey on the existing digital image enhancement technique. They study various research and journal paper related to digital image enhancement along with artificial neural network and some other technique such as interpolation method. Neural network and optimization algorithm propose an efficient preprocessing of image enhancement. In the review of enhancement seen that enhancement technique loss the contrasts and brightness of image. Brightness preserving in image enhance is critical phase. Here they discuss different method of image enhancements with brightness preserving and contrasts.

Gang Cao, Yao Zhao, Rongrong Ni, Xuelong Li Et al. [1] They propose two novel algorithms to detect the contrast enhancement involved manipulations in digital images. First, they focus on the detection of global contrast enhancement applied to the previously JPEG compressed images, which are widespread in real applications. The histogram peak/gap artifacts incurred by the JPEG compression and pixel value mappings are analyzed theoretically, and distinguished by identifying the zero-height gap fingerprints. Second, they propose to identify the composite image created by enforcing contrast adjustment on either one or both source regions. The positions of detected block wise peak/gap bins are clustered for recognizing the contrast enhancement mappings applied to different source regions.

Apurva N. Ganar, C. S. Gode, Sachin M. Jambhulkar Et al.[2] Here they provides specified path to use these primitive features to retrieve the desired image. The technique by which they obtain the required image is CBIR. In CBIR first the HSV colour space is quantified to obtain the colour histogram and texture features. Using these components a feature matrix is formed. Then this matrix is mapped with the characteristic of global colour histogram and local colour histogram, which are analysed and compared. For the co occurrence matrix between the local image and the images in the database to retrieve the image.

P. P. Sarangi, B. S. P. Mishra, B. Majhi, S. Dehuri Et al. [3] They presents an attempt to demonstrate its adaptability and effectiveness for searching global optimal solutions to enhance the contrast and detail in a gray scale image. In this paper contrast enhancement of an image is performed by gray level modification using parameterized intensity transformation function that is considered as an objective function. The task of DE is to adapt the parameters of the transformation function by maximizing the objective fitness criterion. Experimental results are compared with other enhancement techniques, viz. histogram equalization, contrast stretching and particle swarm optimization (PSO) based image enhancement techniques.

Tarun Kumar Agarwal, Mayank Tiwari, Subir Singh Lamba Et al. [4] Low contrast digital images reduce the ability of observer in analyzing the image. Histogram based techniques are used to enhance contrast of all type of medical images. They are mainly used for all type of medical images such as for Mias-mammogram images, these methods are used to find exact locations of cancerous regions and for low-dose CT images, these methods are used to intensify tiny anatomies like vessels, lungs nodules, airways and pulmonary fissures. The most effective method used for contrast enhancement is Histogram Equalization (HE).

Senthilkumaran N, Thimmiaraja J Et al. [5] They study and compare different Techniques like Global Histogram Equalization (GHE), Local histogram equalization (LHE), Brightness preserving Dynamic Histogram equalization (BPDHE) and Adaptive Histogram Equalization (AHE)

using different objective quality measures for MRI brain image Enhancement. The main function of image enhancement is to carry out the hidden part in an image or to enhance the low contrast image. The quality of the image gets better by contrast manipulation. A very well-liked performance for contrast enhancement is Histogram Equalization (HE). The most part of techniques is used, due to simplicity and moderately better performance on images.

S.S. Bedi, Rati Khandelwal Et al. [7] They present an overview of image enhancement processing techniques in spatial domain. More specifically, they categorise processing methods based representative techniques of Image enhancement. Thus the contribution of this paper is to classify and review image enhancement processing techniques, attempt an evaluation of shortcomings and general needs in this field of active research and in last they will point out promising directions on research for image enhancement for future research. The survey of available techniques is based on the existing techniques of image enhancement, which can be classified into two broad categories: Spatial based domain image enhancement and Frequency based domain image enhancement. Spatial based domain image enhancement operates directly on pixels.

Adin Ramirez Rivera, Byungyong Ryu, and Oksam Chae Et al. [8] They propose a content-aware algorithm that enhances dark images, sharpens edges, reveals details in textured regions, and preserves the smoothness of flat regions. The algorithm produces an ad hoc transformation for each image, adapting the mapping functions to each image's characteristics to produce the maximum enhancement. They analyze the contrast of the image in the boundary and textured regions, and group the information with common characteristics. These groups model the relations within the image, from which we extract the transformation functions.

III. PROBLEM STATEMENT

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 "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. CONCLUSION AND FUTURE WORK

This paper provides the complete literature survey on the image enhancement techniques, for the improvement or enhancement the quality of image and their analysis. In this paper we focus only with the brief literature review and analysis f various techniques/methods in the area of image enhancement. In future we focus with the implementation of image enhancement techniques and compare with the existing image enhancement techniques. In future we planning to implement 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 DV and BV. Different architectures and different activation functions is considered. The experimental results will 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 the enhancement process in order to achieve better enhancement effect, the system takes more time to pay; the other for color digital image processing has not been a good result. Therefore, focus on late goals and improve the efficiency of image enhancement. However, the algorithm has a disadvantage of needing more computing time when select a larger hybrid generation.

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