INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume3, Issue2)
Available online at www.ijariit.com

Review Paper on Shifted Histogram Using Optimal Shift Distance for Images with Entropy Value & Wavelet Decomposition Images

Rekha
M.R.I.E.M, Rohtak
rekha030191@gmail.com

Vijay Nandal
M.R.I.E.M, Rohtak
vijay.nandal@yahoo.co.in

Abstract— A histogram is a graphical representation of the brightness values that comprise an image. The brightness values (i.e. 0-255) are displayed along the x-axis of the graph. The frequency of occurrence of each of these values in the image is shown on the y-axis. Histogram of a digital image with intensity level in the range of [0, L-1] is a discrete function $h(r_k) = n_k$ where r_k is the k^{th} intensity level and n_k is no of pixel in the image with intensity r_k. Histogram equalization is a method in image processing of contrast adjustment using the image's histogram. Histogram equalization automatically determines a transformation function that seeks to produce output images that has a uniform histogram. When automatic enhancement is desired that is good approach because result from this technique are predictable and method is simple to implement. Method used to generate a processed image that has a specified histogram is called histogram matching or histogram specification. In this thesis we will use advance algorithm to enhance the quality of an image and we succeeded and also got the entropy value of image by changing the scaling factor K we got different value and also got different shifted histogram image. In our research work we will work on different level to analyze the effect of algorithm. By changing scaling factor we analyse different EME and image enhanced significantly from which lot of important information can be recovered.

Keywords— Pixel, Discrete Cosine Transform, quantization, ac coefficient, Compressed.

I. INTRODUCTION

There is a persistent need for image enhancement, which facilitate further image processing, such as object detection and recognition algorithms. The goal of image enhancement techniques is to improve the characteristic or visual quality of an image, especially the contrast of an image. They can be classified as spatial domain enhancement and transform domain enhancement. Spatial domain techniques deal with the raw image data, altering the intensity values based on a specific algorithm for a set of criteria. Transform domain enhancement techniques involve transforming the image intensity data into a specific domain by using such methods as the Discrete Cosine, Fourier, and Wavelet transforms [1]. These transforms are used to alter the frequency content of an image to improve desired traits, such as high frequency content. An image 'enhancement' is basically anything that makes it easier or better to visually interpret an image. In some cases, like 'low-pass filtering', the enhanced image can actually look worse than the original but such an enhancement was likely performed to help the interpreter see low spatial frequency features among the usual high frequency clutter found in an image. Also, an enhancement is performed for a specific application. This enhancement may be inappropriate for another purpose, which would demand a different type of enhancement. Image enhancement techniques can be divided into three broad categories: Spatial domain methods, which operate directly on pixels [2]. Frequency domain methods, which operate on the Fourier transform of an image. Fuzzy domain methods, which involves the use of knowledge-based systems that are capable of mimicking the behaviour of a human expert. Following graph show the basic view of image processing.

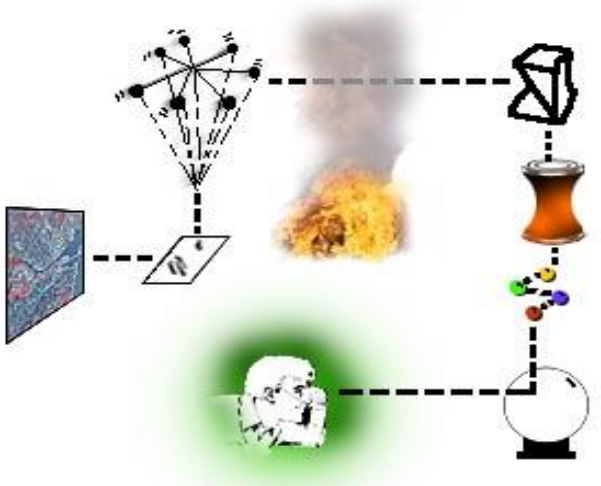

Figure 1 Image processing view

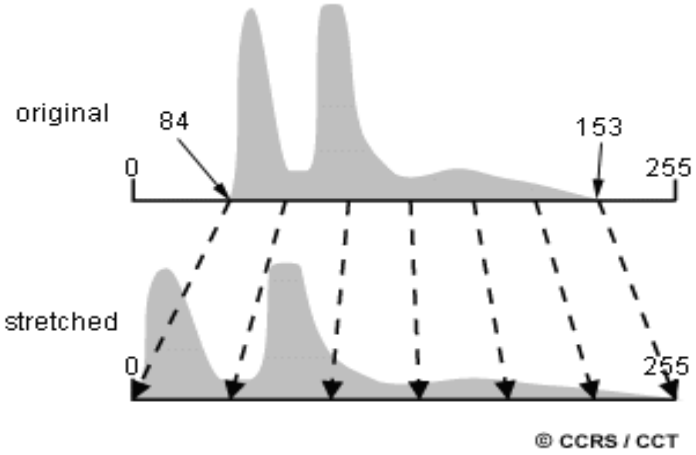

Figure 2 Histogram representation of an image along x (brightness) and y (frequency) axis

II. LITERATURE SURVEY

Image enhancement technique plays vital role in improving the quality of the image. Enhancement technique basically enhances the foreground information and retains the background and improve the overall contrast of an image. In some case the background of an image hides the structural information of an image [4-6]. Transform domain enhancement techniques involve transforming the image intensity data into a specific domain by using methods such as DFT, DCT, etc. and the image is enhanced by altering the frequency content of the image. Each of these methods has strong and weak points. Hence, the combination of the above two methods are used to enhance the image. A whiteboard can be an easy tool for collaboration such as brainstorming, and is widely used, but the content on a whiteboard is hard to archive and share. While digital cameras can be used to capture whiteboard content, the images are usually taken from an angle, resulting in undesired perspective distortion. Accurate computation of image motion enables the enhancement of image sequences [7-8]. In scenes having multiple moving objects the motion computation is performed together with object segmentation by using a unique temporal integration approach. After computing the motion for the image regions these regions can be enhanced by fusing several successive frames covering the same region. Enhancements treated here include improvement of image resolution [13]. . Digital image enhancement techniques provide a multitude of choices for improving the visual quality of images. Guided image filter is an explicit image filter, derived from a local linear model; it generates the filtering output by considering the content of a guidance image, which can be the input image itself or another different image. Moreover, the guided filter has a fast and non-approximate linear-time algorithm, whose computational complexity is independent of the filtering kernel size.

III. PLANNING OF WORK/METHODOLOGY

Our research work mainly divided into four main segments. Main objective of this thesis is to enhance the image with help of histogram shifting and shaping in such a way that more information can be extracted from distorted or blurred image. After each equalization image is sharpened and more information can be extracted.

- Histogram of image and after that with value of optimal shift distance K1, K2, K3 and K4 to draw of shifted histogram of original image and finally to find out enhanced image.

- To find out wavelet decomposition images of original image and Value of EME
- Besides this we will focus on CDF, PDF and Equalization of image

Point-processing algorithms enhance each pixel separately. Thus, interactions and dependencies between pixels are ignored, and operations that utilize multiple pixels to determine the value of a given pixel are not allowed. . Point operations can be identified for images of any dimensionality. However, in the rest of this section, we consider the two-dimensional monochromatic image defined by a discrete space coordinate system n = (n1, n2) with n1 = 0,1. . .N_1 and n2 = 0,1. . .M_1. The image data is contained in a N_M matrix, and the discrete space image f(n) is obtained by sampling a continuous image f(x, y).

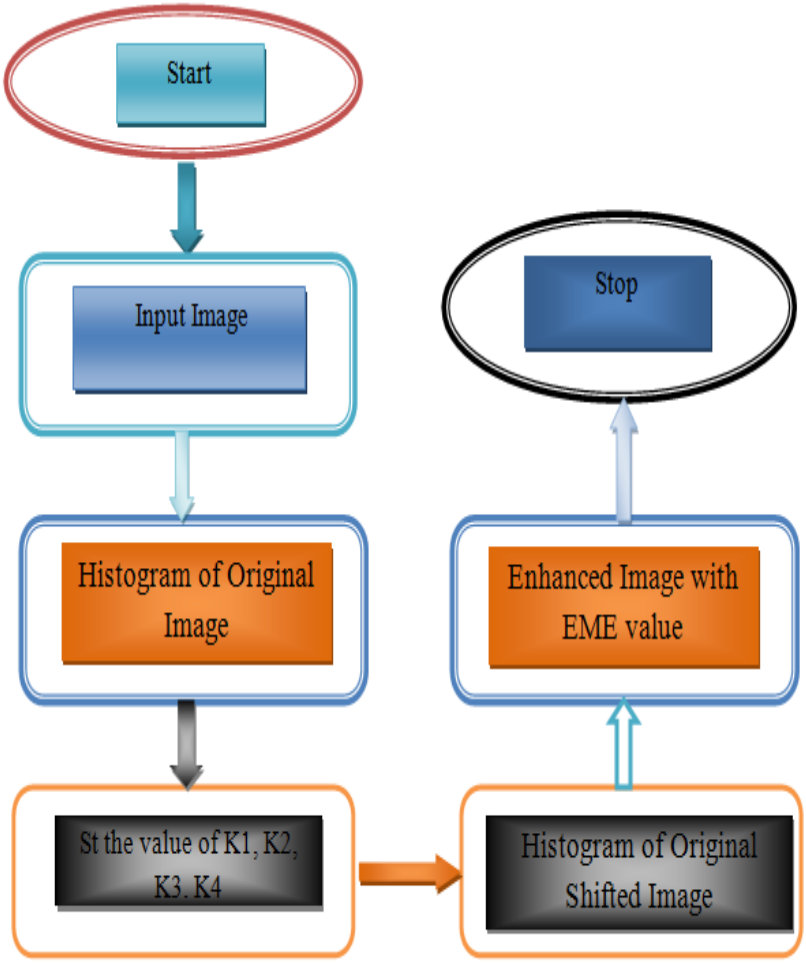

Figure 3 Image processing view

Histogram equalization involves finding a grey scale transformation function that creates an output image with a uniform histogram (or nearly so). How do we determine this grey scale transformation function? Assume our grey levels are continuous and have been normalized to lie between 0 and 1. We must find a transformation T that maps grey values r in the input image F to grey values s = T(r) in the transformed image.

T is single valued and monotonically increasing [10-11].

$$0<T(r)<1 \text{ for } 0<r<1.$$

The inverse transformation from s to r is given by

$$r = T\text{-}1(s)$$

If one takes the histogram for the input image and normalizes it so that the area under the histogram is 1, we have a probability distribution for grey levels in the input image Pr(r)[12]. If we transform the input image to get s = T(r) what is the probability distribution Ps(s). From probability theory it turns out that

$$P_s(s) = P_r(r)\frac{dr}{ds}, \qquad \text{Where } r = T\text{-}1(s)$$

Consider the transformation

$$s = T(r) = \int_o^r \Pr(w)\,dw$$

This is the cumulative distribution function of *r*. Using this definition of *T* we see that the derivative of *s* with respect to *r* is

$$\frac{ds}{dr} = P_r(r)$$

Substituting this back into the expression for Ps, we get

$$P_s(s) = P_r(r)\frac{1}{P_r(r)} = 1 \quad , \quad \text{where } 0 \le s \le 1$$

Thus, Ps(s) is now a uniform distribution function, which is what we want.

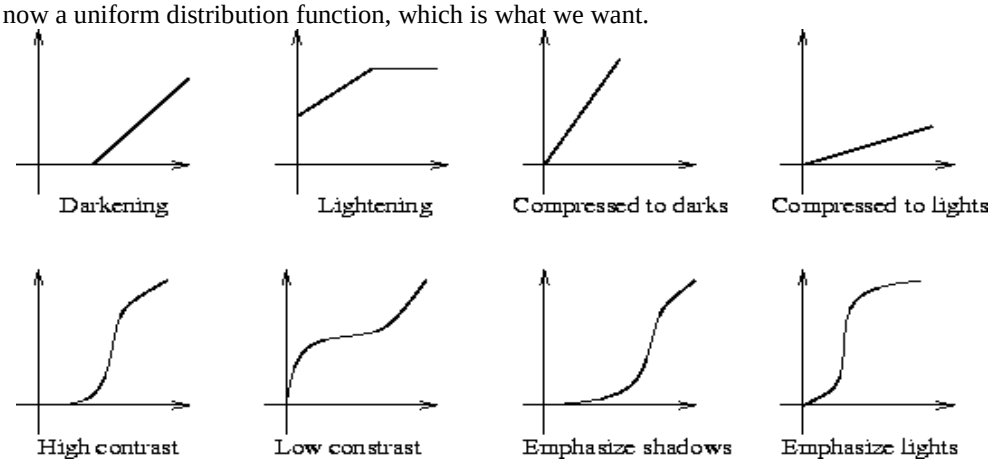

Figure 4 Grey scale transformations of an image

Filtering: Low pass filtering involves the elimination of the high frequency components in the image. It results in blurring of the image (and thus a reduction in sharp transitions associated with noise). An ideal low pass filter would retain all the low frequency components, and eliminate all the high frequency components. However, ideal filters suffer from two problems: blurring and ringing [3]. These problems are caused by the shape of the associated spatial domain filter, which has a large number of undulations. Smoother transitions in the frequency domain filter, such as the Butterworth filter, achieve much better results.

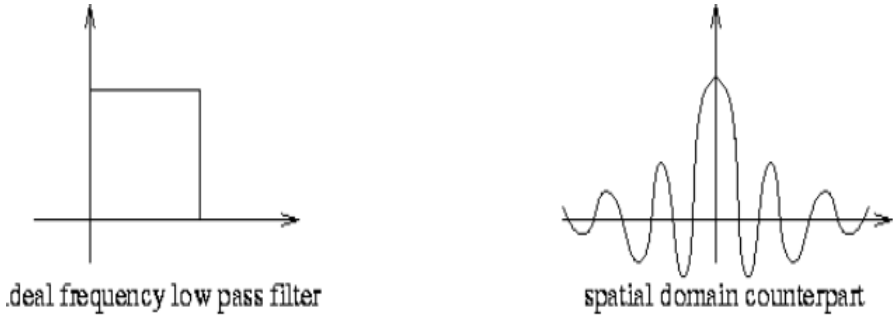

Figure 5 Transfer function for an ideal LPF

IV. SOFTWARE USED AND SIMULATION RESULT

Software: MATLAB Version R2015a: It is powerful software that provides an environment for numerical computation as well as graphical display of outputs. In MATLAB the data input is in the ASCII format as well as binary format. It is high-performance language for technical computing integrates computation, visualization, and programming in a simple way where problems and solutions are expressed in familiar mathematical notation.

- Acquisition, Data Exploration, Analysing &Visualization
- Engineering complex drawing and scientific graphics
- Analysing of algorithmic designing
- Mathematical and Computational functions
- Modelling and simulating problems prototyping
- GUI (graphical user interface) building environment.

Using MATLAB, you can solve technical computing problems very easily and time saving as compared to traditional programming languages, such as C, C++, and FORTRAN.
The name MATLAB stands for matrix laboratory.

MATLAB Features

- MATLAB is a high-level language used for numerical computation, visualization, and application development

- It create very friendly environment for iterative exploration, design, and problem solving
- Mathematical functions for solving ordinary differential equations, Fourier analysis, linear algebra, statistics, filtering, optimization, numerical integration
- Development tools for enhancing code quality and maximizing performance
- Tools for building applications with custom graphical interfaces (GUI)
- Functions for integrating MATLAB based algorithms with external applications and we can able to generate code in hex file, c, embedded etc.

CONCLUSION

The main priority of this research is on image enhancement using spatial domain method. We will execute experiment on many images. In recent years, many researchers have applied spatial domain method to develop image processing algorithms. In thesis work one membership function will be defined to enhance the image and algorithm is proposed. The proposed algorithm will be implemented in MATLAB 2015a. After applying purposed algorithm we are able to see that in base paper there is concept of single value of K but in our purposed algorithm we used four different value of K and due to which we got shifted histogram as we change the value of K and different value of EME. Besides this we also got PDF and CDF function of images. Besides this we will execute back to back equalization of an image to enhance the property of the image so that we can get more information regarding that image.

REFERENCES

[1] K.Joung-Youn,K.Lee-SUP, and H.Seung-Ho, " An advanced contrast enhancement using partially overlapped sub-block histogram equalization ," Circuits and Systems for Video Technology, IEEE Transactions on vol.11,pp.475-484,2001.

[2] J. Duan and G. Qiu, "Novel histogram processing for colour image enhancement, " in Proc. 3rd Int. Conf. Image and Graphics, Dec. 2004, pp. 55–58.

[3] W.Chao and Y.Zhongfu, "Brightness preserving histogram equalization with maximum entropy: a cariational perspective," IEEE Trans on Consumer Electonics, vol.51,pp.1326-1334,2005

[4] J. Tang, E. Peli, and S. Acton, "Image enhancement using a contrast measure in the compressed domain," IEEE Signal Process. Lett., vol 10 no 10,pp.289-292,2003

[5] J.C.Fu, H.C.Lien and S.T.C. Wong, "Wavelet-based histogram equalization enhancement of gastic sonogram images," Computerized Medical Image and Graphics,vol.24,pp.59-68,2000

[6] S. DelMarco and S. Agaian, "The design of wavelets for image enhancement and target detection," in Mobile Multimedia/Image Processing,Security, and Applications 2009 Orlando, FL,USA 2009, pp. 735103-12.

[7] J. Tang, X. Liu, and Q.Sun, "A direct image contrast enhancement algotithm in the wavelet domain for screening mammograms," Selected Topics in Signal Processing, IEEE Journal of , vol.3,pp.74-80,2009

[8] B. Silver, S. S. Agaian, and K. A. Panetta, "Logarithmic transform coefficient histogram matching with spatial equalization," presented at the SPIE Defense and Security Symp., Mar. 2005.

[9] A. Avanaki, "Exact global histogram specification optimized for structural similarity, " Optical Processing,vol.39,pp.613-621,2009

[10] S.Chen and A.Ramli, "Minimum mean brightness error bi-histogram equalization in contrast enhancement," IEEE Trans. Consum.Electron., vol. 49, no. 4, pp. 1310–1319, Nov. 2001.

[11] S. Agaian, K. Panetta, and A. Grigoryan, "Transform based image enhancement with performance measure," IEEE Trans. Image Proces., vol. 10, no. 3, pp. 367–381, Mar. 2001.

[12] S. Agaian, B. Silver and K. Panetta, "Transform coefficient histogrambased image enhancement alogrithms using contrast entropy," in IEEE Transactions on Image Processing, vol.16,no.3,pp.741-758,2007

[13] Y. Wan, and D.Shi, "Joint Exact Histogram Specification and Image Enhancement through the Wavelet Transform" IEEE Trans. Image Processing, vol.16,no.9, Sep 2007 [19] M. N. Do, Directional Multiresolution Image Representations, Ph.D. Thesis, Department of Communication Systems, Swiss Federal Institute of Technology Lausanne, Nov 2001

