INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume3, Issue4)
Available online at www.ijariit.com

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

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Abstract*: 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 have a uniform histogram. When the automatic enhancement is desired that is a good approach because result from this technique is predictable and method is simple to implement. The method used to generate a processed image that has a specified histogram is called histogram matching or histogram specification. In this thesis we applied the advanced 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 worked on a different level to analyze the effect of the algorithm. By changing scaling factor we get different EME and image enhanced significantly from which a lot of important information can be recovered.

***Keywords*: Gaussian, Histogram Matching, Spatial Domain, Visual, Coordinates.**

I. INTRODUCTION

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 [1-3]. 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. Frequency domain methods, which operate on the Fourier transform of an image. By manipulating the range of digital values in an image, graphically represented by its histogram, we can apply various enhancements to the data. There are many different techniques and methods of enhancing contrast and detail in an image

(a) **(b)**

Fig.1 Increase in Contrast in an Image before (a) and after (b) a Linear Contrast Stretch

Spatial filters are designed to highlight or suppress specific features in an image based on their spatial frequency. Spatial frequency is related to the concept of image texture [4-5]. It refers to the frequency of the variations in tone that appear in an image. "Rough" textured areas of an image, where the changes in tone are abrupt over a small area, have high spatial frequencies,

while "smooth" areas with little variation in tone over several pixels have low spatial frequencies. Nonlinear enhancement algorithms are the transform-mapping framework [9]. In the approach, an image frame is first processed with a transform operator that separates the original image into two components. One is semantically meaningful, while the other contains noise. A nonlinear mapping then removes the noise, and the enhanced image corresponds to the inverse transform of the modified data [11-14].

Fig.2 Denoising with the Wavelet Transforms

II. LITERATURE SURVEY

The aim of image enhancement is to improve the visual appearance of an image or to provide a “better transform representation for future automated image processing [7]. Many images like medical images, satellite images, aerial images and even real life photographs suffer from poor contrast and noise. It is necessary to enhance the contrast and remove the noise to increase image quality. One of the most important stages in medical images detection and analysis is Image Enhancement techniques which improve the quality (clarity) of images for human viewing, removing blurring and noise, increasing contrast, and revealing details are examples of enhancement operations [16-18]. 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. In scenes having multiple moving objects, the motion computation is performed together with object segmentation by using a unique temporal integration approach [20-21]. 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

There are so many techniques to enhance the image so that useful information can be extracted and can be processed further as per requirement of an application**.** Our research work mainly divided into four main segments [24-26]. The 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 the distorted or blurred image. As equalization is carried out on the image it will be sharpened. In our dissertation work following work will be carried out which is depicted as Histogram of the image and after that with a value of optimal shift distance K1, K2, K3 and K4 to draw of shifted histogram of the 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 the 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 [29-31]. 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).

FLOW CHART OF OUR DISSERTATION WORK

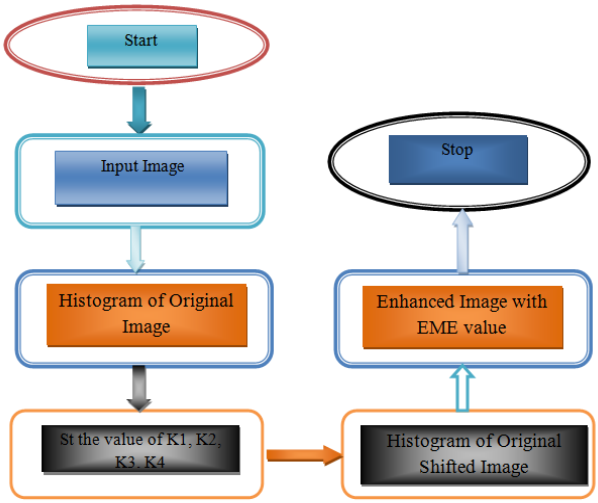

Fig.3 Image processing view

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.

Image sharpening

The main aim in image sharpening is to highlight fine detail in the image or to enhance detail that has been blurred (perhaps due to noise or other effects, such as motion). With image sharpening, we want to enhance the high-frequency components; this implies a spatial filter shape that has a high positive component at the center.

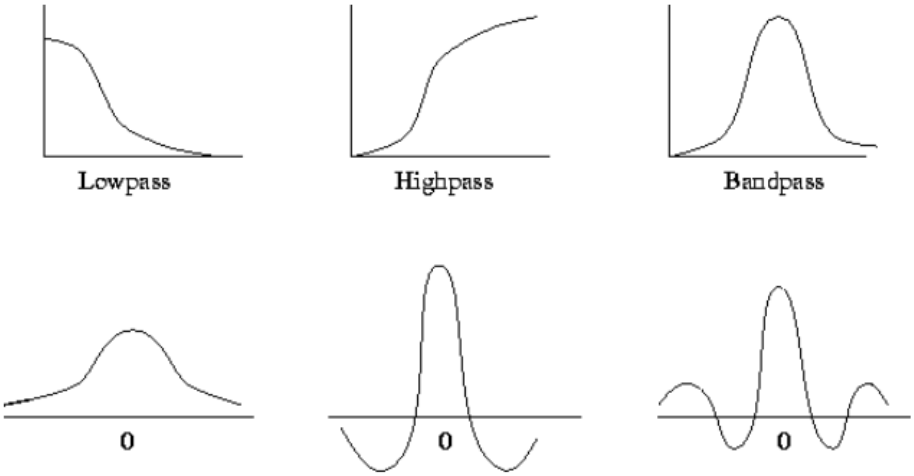

Fig. 4Frequency Domain Filter with their Spatial Domain Counterpart

IV. SOFTWARE USED AND SIMULATION RESULT

Software: MATLAB Version R2015a: It is powerful software that provides an environment for numerical computation as well as a graphical display of outputs. In Matlab, the data input is in the ASCII format as well as binary format. It is a 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. 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.

We segmented our thesis in a different part and in last part we executed enhanced image by applying purpose algorithm. In purpose algorithm, first of all, we take an input image and after that histogram drawn and then we change the value of K1, K2, K3, K4 it means we shifted the value and now we got the shifted histogram plot. As we change the value of K then there is slight variation in the value of EME.

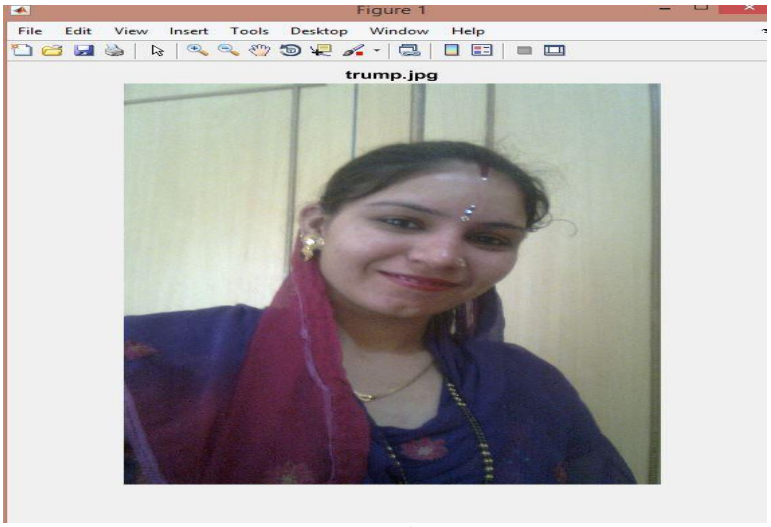

Fig.5 Original image for enhancement

Wavelet is a mathematical function which is used to segment given function or continuous-time signal into different scale components. Usually one can assign a frequency range to each scale component.

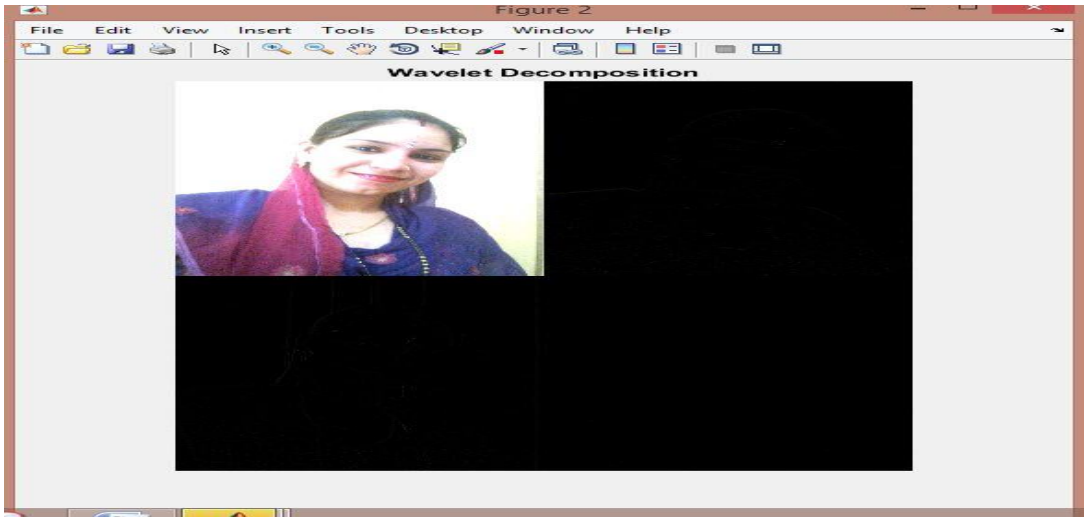

Fig. 6Wavelet decomposition of image

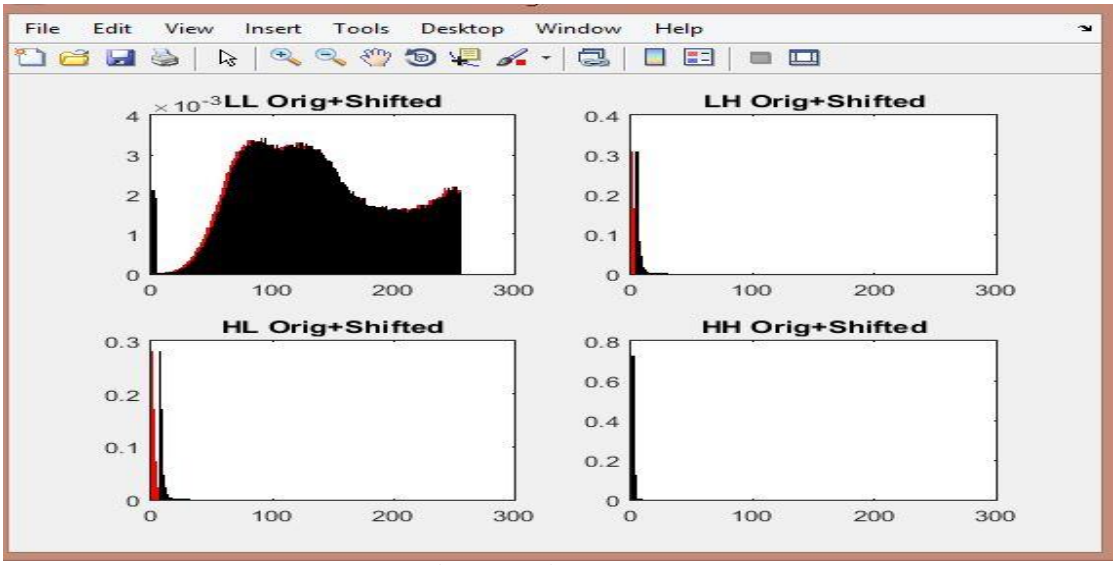

Fig. 7 Shifted image of histogram equalization

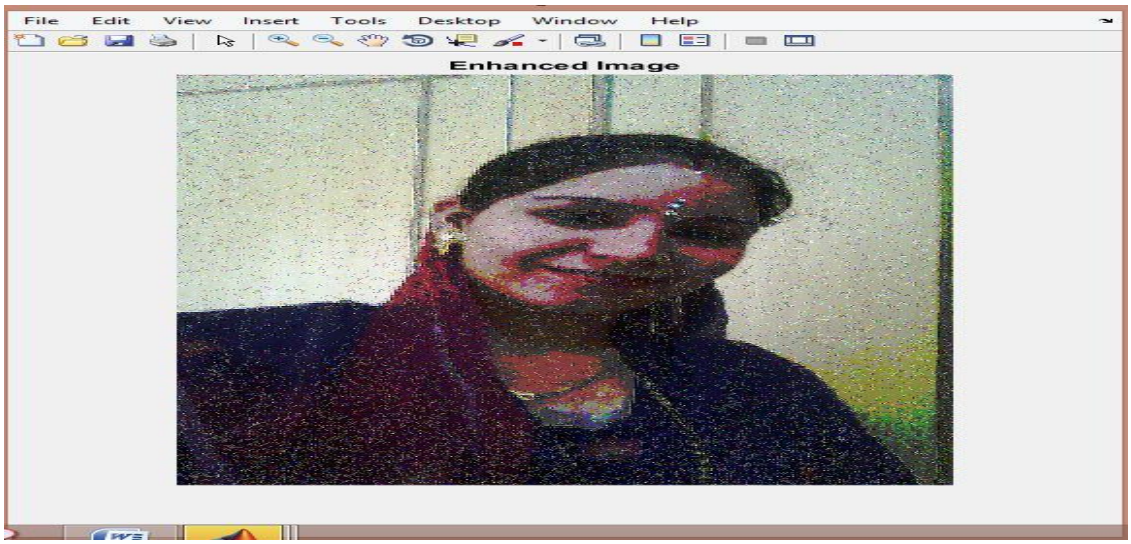

Fig.8 Enhancement Image

Sr. No.	K1	K2	K3	K4	EME
1	1	0	0	0	7.1860
2	1	3	4	5	7.3206
3	3	4	6	1	7.3282
4	3	4	8	2	7.5031
5	4	8	10	12	7.2629

Fig.9 EME value for different value of K

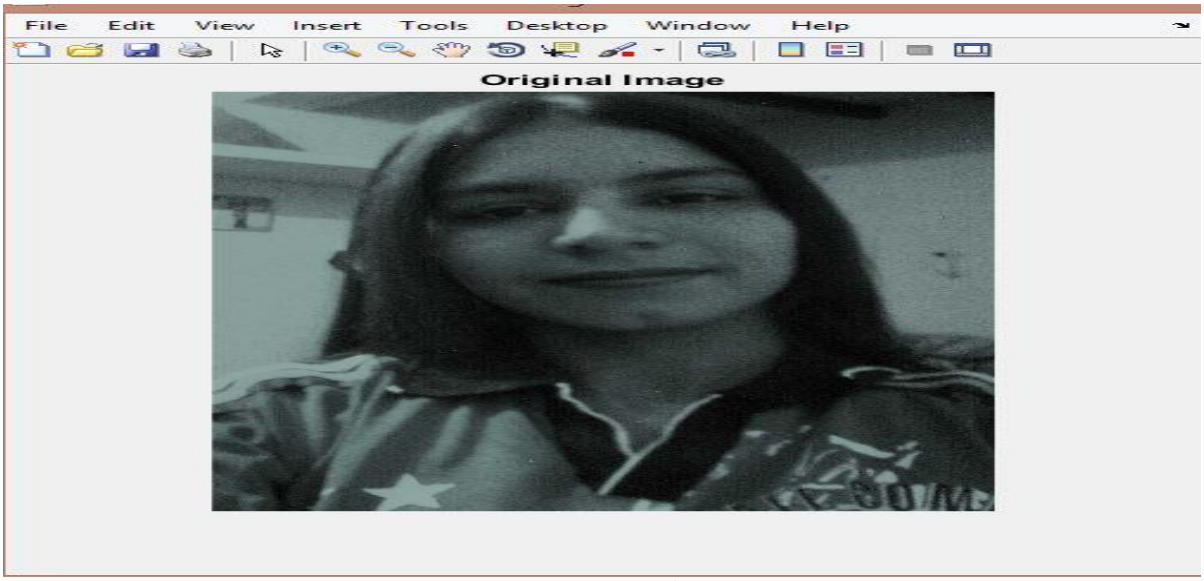

Fig.10 Original image taken for histogram

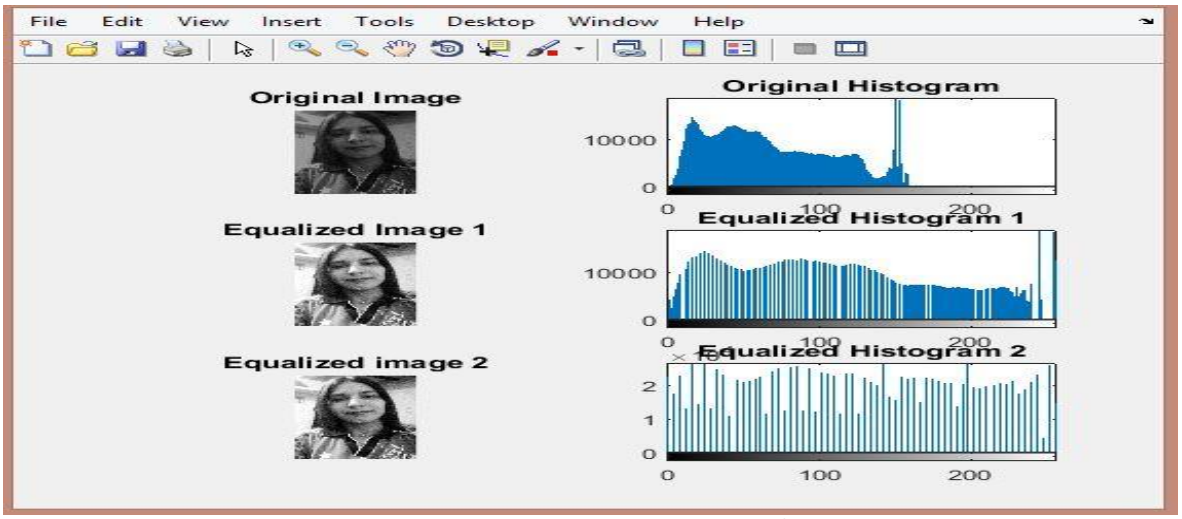

Fig.11 Combined result with their equalized histogram for 2 iteration

Fig.12 Represent original image

Fig.13 Represents Gaussian matched histogram

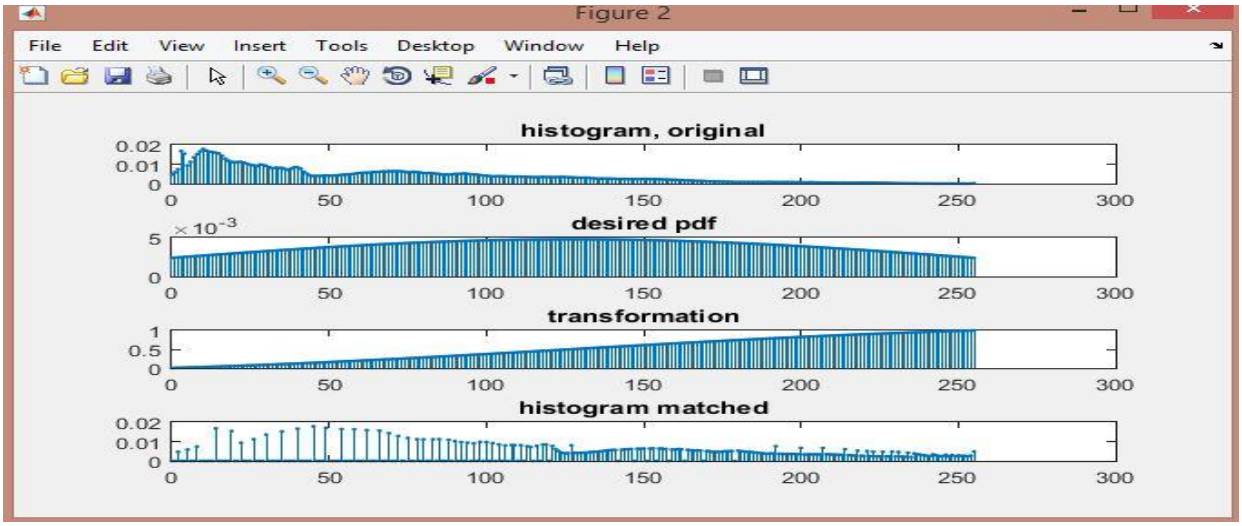

Fig.14 Represent the desired PDF, transformation and histogram matched

CONCLUSION

In this dissertation we applied 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 histogra m image. In our research work, we worked on a different level to analyse the effect of the algorithm. The main priority of this research is on image enhancement using spatial domain method. We executed 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 is defined to enhance the image and algorithm are proposed. The proposed algorithm is implemented in MATLAB 2015a. After applying purpose algorithm we are able to see that in the base paper there is the concept of the 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 a different value of EME. Besides this, we also got PDF and CDF function of images. In one segment of our thesis, we implement double histogram equalization technique for binary images in which we are enough capable of enhancing original image intensity that we can extract maximum information from that image. This algorithm achieved better-contrasted image which increases the brightness of the low contrasted images. The experimental result shows that the brightness is increased as compared to previous one. Future work can be extended for other images like tiff, BMP, jpeg images than greyscale images to obtain a better result with accuracy. Image enhancement techniques are very crucial and used for forest mapping classification techniques, Project scope definition, and scope change control. Image enhancement techniques used in many areas.

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