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Image Enhancement using Modified Histogram Equalization with DSIHE

Ribana K[1]

Assistant Professor, Department of ECE, M. Kumarasamy College of Engineering, Karur, India[1]

Abstract: Enhancing is the process can be done in many ways for obtaining more details from the images that can be attain by image extraction, contrast enhancement, denioising and dehazing are the various techniques for the image enhancement. In our paper the enhancement is obtain with the help of contrast enhancement technique. Improving the contrast is the process of introducing necessary difference between the pixel values of an input image to obtain more informative output image. The proposed algorithm is done by modifying the original image histogram and performs histogram equalization then the final image obtained by combining the histogram equalized image with DSIHE image.

Keywords: contrast enhancement, dehazing, filtering, denioising.

I. INTRODUCTION

The modification of histogram equalization techniques have been introduced for eliminating the drawbacks present in the traditional technique some drawbacks of histogram equalization technique is noted here it produces over enhancement due to the equalized output histogram and introduces more noise in an output image because of under and over enhancement[1].The modification of histogram equalization gives the way to introduce new modification technique with minimum noise and acceptable enhancement and visual quality at the output.

The initial modification is obtained from the mean value of an image that will be use full for dividing the histogram of original image and that divided histograms are under gone to histogram equalization technique this technique is named as Bi-Histogram Equalization (BBHE)[2].The median value is taken as the parameter for dividing the image histogram that is be named as Dualistic Sub image Histogram Equalization (DSIHE)[3].The local mean value calculation is produce Recursive Sub image Histogram Equalization(RSIHE)[4].

II. PREVIOUS WORK

This part describes previous algorithms and methods for contrast enhancement in the literature

A. Histogram Equalisation (HE)
Widely using technique for contrast enhancement application is histogram equalization. The enhancement can derived in three steps by using this algorithm the initial step is the calculation of histogram using Probability Density Function. From that the CDF is calculated by cumulatively adding PDF. The final image transformation is obtained by multiplying the CDF with the difference between the maximum and minimum pixel values and add the value with minimum pixel value in the input image.

B. Brightness Preserving Bi-Histogram Equalization (BBHE)
The input image histogram is calculated by using PDF value then it is compared with the mean value of an input image when histogram is having lesser value compared to the mean it is separated as one histogram the remaining pixel values are used to compute the another histogram the final image is calculated by equalizing the histogram separately by histogram equalization technique then it will be added to get the output image.

C. Dualistic Sub-Image Histogram Equalization (DSIHE)
The procedure for attaining this algorithm is as similar to the BBHE algorithm but the separation of the image histogram is calculated by median value of an original image.

D. Gamma Correction (GC)
A gamma correction technique changes the pixel values of an image by varying the exponential value (i.e) gamma [10]. The gamma correction is obtained by,

$$T(k) = k_{max} \times \left(\frac{k}{k_{max}}\right)^{\gamma} \quad (1)$$

The contrast of an image is improving in a better way but the enhancement is not depends on the input pixel values it enhances the image in a similar way.

III. PROPOSED ALGORITHM

In the literature review about the enhancement algorithm clearly shows that the algorithm can produce better enhancement but it cannot attain the minimum brightness error as well as considerable PSNR value for attain that in our proposed algorithm the original image histogram is modified as

$$H_{modified}=\theta H+(1-\theta)H_u \quad (2)$$

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The modified histogram is generated by adding the original image histogram with uniform histogram for producing the better visual quality as well as better enhancement the enhancement level is controlled by the parameter θ .the value of θ is maintained as 0.5 for smooth enhancement of an image. After producing the modified histogram equalization the DSIHE of original image is fused with modified histogram equalized image the output image can produce better enhancement when compared with the existing algorithms. The fusion of images can be calculated through DWT of modified histogram equalization image and DSIHE image. Each band of the two images is fused by the fusion technique for producing the final image. Then IWDT have been taken for maintaining the originality of an image.DWT is preferred for separating the bands because it can produce perfect inversion at the output. The algorithmic steps as follows,

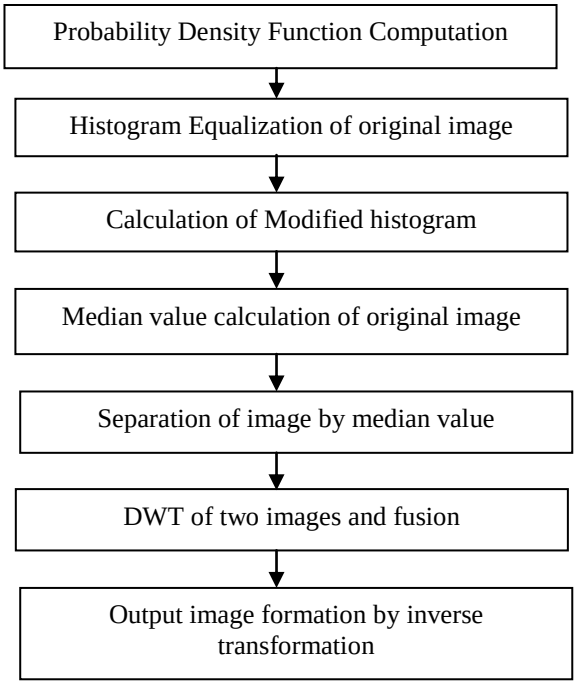

Fig1 Proposed algorithm steps

IV. RESULT AND DISCUSSION

The proposed algorithm is performed using MATLAB2013a.and it is compared with the existing algorithms HE, BBHE, DSIHE, and GC. The proposed algorithm is compared with the existing

(a) (b)

(c) (d)

(e) (f)

Fig. 2 . Simulation results of HE, BBHE,DSIHE, GC,AGC and proposed algorithms (a) Original image (b) Histogram Equalised image (c) Brightness Preserving Bi-Histogram Equalised image (d) Dualistic Sub Image Histogram Equalisation (e) Gamma corrected image (f) Proposed Image.

TABLE 1 Peak Signal to Noise Ratio (PSNR) For HE, BBHE, DSIHE, GC and proposed algorithms

ENHANCEMENT METHODS	PSNR(dB)
Histogram Equalisation	16.19
Brightness Preserving Bi-Histogram Equalisation	17.28
Dualistic Sub-Image Histogram Equalisation	18.24
Gamma Correction	16.17
Propded algorithm	34.27

TABLE 2 Mean Square Error (MSE) For HE, BBHE, DSIHE, GC and Proposed agorithm

ENHANCEMENT METHODS	AMBE
HistogramEqualisation	109.30
Brightness Preserving Bi-Histogram Equalisation	55.15
Dualistic Sub Image Histogram Equalisation	20.84
Gamma Correction	46.53
Proposed algorithm	42.37

V. CONCLUSION AND FUTURE WORK

The proposed algorithm is compared with existing methods it performs well by providing better results and visual presentation it can be modified for color images and

the algorithm can be modified and extended for ultrasound images for medical applications.

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