

AN EFFICIENT TECHNIQUE FOR ENHANCING MRI BRAIN IMAGES

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ABSTRACT

Attractive reverberation imaging (MRI) of the mind is a valuable device to encourage doctor's conclusions and watch over a blend of cerebrum infections including stroke, malignancy, and epilepsy. It presents correct data to find the ailments. Histogram balance is one of the vital strides in picture upgrade system for MRI. This paper thinks about various strategies like Brightness Preserving Bi-Histogram Equalization (BPBHE), Recursive Mean Separated Histogram Equalization (RMSHE), Brightness Preserving Dynamic Histogram Equalization (BPDHE), Dualistic Sub-Image Histogram Equalization (DSIHE), Minimum Mean Brightness Error Bi-HE Method (MMBEBHE), utilizing distinctive target quality measurements for MRI mind picture Enhancement.

I. INTRODUCTION

Picture handling is a tremendous and requesting region and its applications utilized as a part of different fields like restorative pictures, satellite pictures and furthermore in modern applications [1]. Vision is the most exceptional of our faculty Picture Enhancement procedures are utilized

.es; pictures play the absolute most critical part in human recognition [2]. In Medicine Digital Image Processing methods are utilized to improve the complexity for simpler understanding of X-beams and other Bio-restorative pictures. Attractive reverberation imaging (MRI) of the cerebrum is a safe and easy test that uses an attractive field and radio waves to produce inside and out pictures of the mind and the mind stem. X-ray imaging is also utilized when treating cerebrum tumors, draining and swelling and so forth.

To build up the picture include for human discernment. It is characterized as a strategy for a picture handling to such an extent that the outcome is a great deal more suitable than the first picture. Histogram balance is a major instrument in picture Enhancement. It is probably going to help in discerning of how the normal power level in the histogram of the evened out picture is superior to the first. Its capacity is increment the dynamic scope of power levels in a picture [3].

This paper is composed as takes after. Segment II Introduces about the cerebrum picture Enhancement. Segment III talk about the Histogram Equalization Techniquethis Techniques and the conditions are clarified. Segment IV manage Measurement of HE. Areas V examine the Analysis of trials and results for HE, the charts shows the Histogram Equalization for every one of the strategies.

II .EXISTING METHOD

A. Brightness Preserving Bi-Histogram Equalization (BPHHE)

BPHHE method divides the image histogram into two parts. The separation intensity is presented by the input mean brightness value, which is the average intensity of all pixels that construct the input image. After this separation process, these two histograms are independently equalized. By doing this, the mean brightness of the resultant image will lie between the input mean and the middle gray level. The histogram with range from 0 to L-1 is divided into two parts, with separating intensity. This separation produces two histograms. The first histogram has the range of 0 to X_m , while the second histogram has the range of X_m to L-1 [4]. Let X_m be, the mean of the image X and assume that $X_m \in \{X_0, X_1, \dots, X_{L-1}\}$ the mean. The input image is decomposed into two sub-images X_L and X_U [2].

B. The Recursive Mean Separated Histogram Equalization (RMSHE)

The Recursive Mean Separated Histogram Equalization RMSHE is an extensive description of the Brightness Preserving Bi-Histogram Equalization BBHE method. BBHE specified that performing mean-separation earlier than the equalization process does preserve an image's original brightness. It is described by decomposing the original image into two new sub-images based on the mean of the input image. This is consequent to divide the histogram into two based on the mean of the input image's histogram [9]. After mean separation, the secondary new histograms are equalized independently. Instead of decomposing the image simply once, the RMSHE method proposes to execute image decomposition recursively, up to a scale r, generating 2^r sub-images [4]. Consider one of the segmented histograms $H_t(X)$ defined over gray level range $[X_L, X_U]$. The mean X_M^t of the sub-histogram $H_t(X)$ is computed by using

$$X_M^t = \frac{\sum_k^u k \cdot p(k)}{\sum_k^u p(k)}$$

C. The Brightness Preserving Dynamic Histogram Equalization (BPDHE)

The Brightness Preserving Dynamic Histogram Equalization BPDHE is an extension to HE that can produce the output image with the mean intensity almost same as that of the input image it completes the requirement of preserving the mean brightness of the image. The method partitions the histogram based on the local maximum of the smoothed histogram [5]. This method is really an expansion to both MPHEBP and DHE. Similar to MPHEBP, the method partitions the histogram based on the local maximums of the smoothed histogram [4]. However, before the histogram equalization attractive the place, the method will map each partition to a new active range, similar to DHE. The change in the dynamic range will cause the change in mean brightness; the final step of this method involves the normalization of the output intensity. So, the average intensity of the resultant image will be same as the

input. With this criterion, BPDHE will produce better enhancement compared with MPHEBP, and better in preserving the mean brightness compared with DHE.

D. Dualistic Sub-Image Histogram Equalization (DSIHE)

Dualistic sub-image HE follows the same basic idea of BBHE method. It decomposes the original image into two sub-images and then equalizes the histograms of the sub-images separately. Instead of decomposing the image based on its mean gray level, the method decomposed into two sub-images, being one dark and one bright, respecting the equal area property [4] [5]. It is shown that the brightness of the output image O formed by the DSIHE method is the normal of the equal area level of the image I and the middle gray level of the image, i.e., $L/2$. The authors of say that the brightness of the output image generated by the DSIHE method does not in attendance a major shift in relation to the brightness of the input image, particularly for the large area of the image with the same gray-levels (represented by small areas in histograms with great concentration of gray levels), e.g., images with small objects regarding to great darker or brighter backgrounds.

III. PROPOSED METHOD

Minimum Mean Brightness Error Bi-HE Method (MMBEBHE):

It also follows the same basic principle of decomposing an image and then applying the HE method to equalize the resulting sub-images independently. The main difference between these technique is that earlier consider only the input image to execute the decomposition while the MMBEBHE searches for a threshold level that decomposes the image I into two sub-images $I [0, l_t]$ and $I [l_t + 1, L - 1]$,

such that the minimum brightness difference between the input image and the output image is accomplished, that is called as absolute mean brightness error difference between the input image and the output image is achieved, whereas the former methods consider only the input image to perform the decomposition [5] Once the input image is decomposed by the threshold level l_t , each of the two sub-images $I [0, l_t]$ and $I [l_t + 1, L - 1]$ has its histogram equalized by the classical HE process, produce the output image. Assumptions and manipulations for finding the threshold level l_t in $O(L)$ time complexity was made in. Such approach allows us to obtain the brightness $I_m(O [0, l_t] \cup O [l_t + 1, L - 1])$ of the output image without generating the output image for each candidate threshold level l_t , and its aim is to produce a method suitable for real-time applications.

1. Brain tumors

A brain tumor or intracranial neoplasm occurs when abnormal cells form within the brain. There are two main types of tumors: malignant or cancerous tumors and benign tumors. Cancerous tumors can be divided into primary tumors that start within the brain, and secondary tumors that have spread from somewhere else, known as brain metastasis tumors. All types of brain tumors may produce symptoms that vary depending on the part of the brain involved.

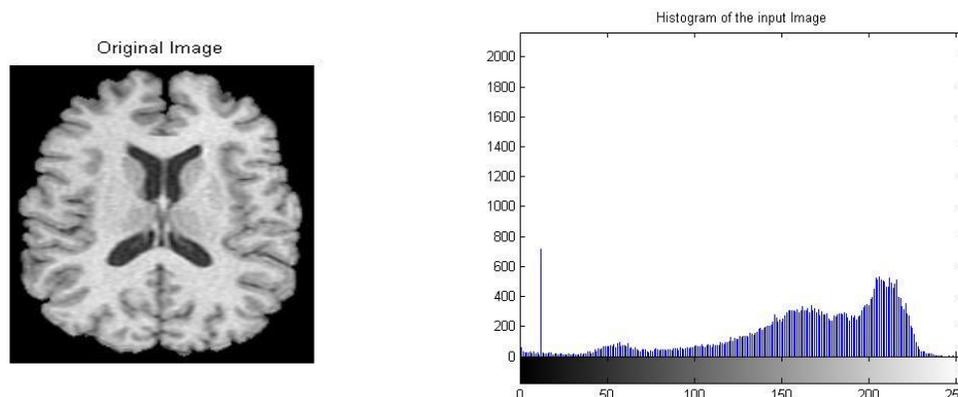
These symptoms may include headaches, seizures, problem with vision, vomiting, and mental changes. The headache is classically worse in the morning and goes away with vomiting. More specific problems may include difficulty in walking, speaking, and with sensation. As the disease progresses unconsciousness may occur.

2. Bleeding and swelling

Intracerebral hemorrhage (ICH), also known as cerebral bleed, is a type of intracranial bleed that occurs within the brain tissue or ventricles. Symptoms can include headache, one-sided weakness, vomiting, seizures, decreased level of consciousness, and neck stiffness. Often symptoms get worse over time. Fever is also common. In many cases bleeding is present in both the brain tissue and the ventricles. Causes include brain trauma, aneurysms, arteriovenous malformations, and brain tumors. The largest risk factors for spontaneous bleeding are high blood pressure and amyloidosis. Excess fluid in the ventricles of the brain leads to a condition known as hydrocephalus. The fluid exerts outward pressure on the brain tissue, pressing it into the skull. In the skull of an infant or small child, where there are soft areas known as fontanelles and sutures between the bony plates that have not yet hardened, the head can increase in size. Fluid collection within the brain tissue, called cerebral edema, can result from numerous causes, including infections, trauma, stroke, brain tumors, certain toxic substances, complications of diabetes, chemical imbalances, abuse of opioids, extreme high blood pressure (malignant hypertension), or high altitude sickness.

IV. RESULTS

Coding output



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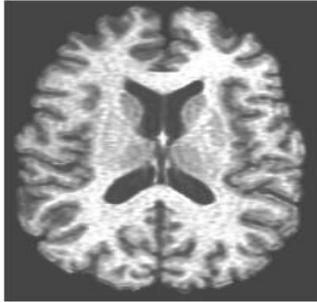
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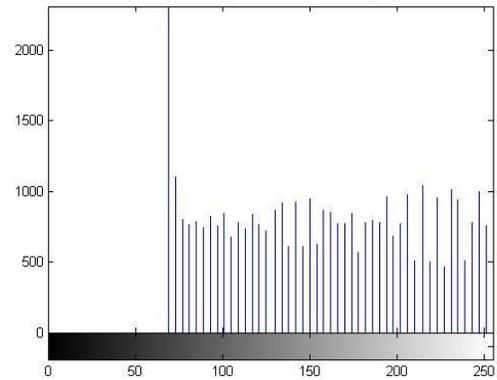
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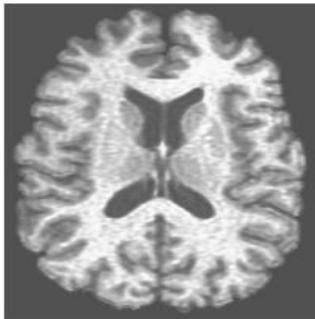
BPBHE Image



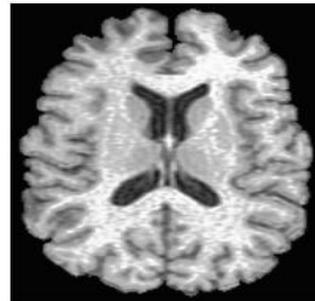
Hist of Histogram of the BPBHE Image



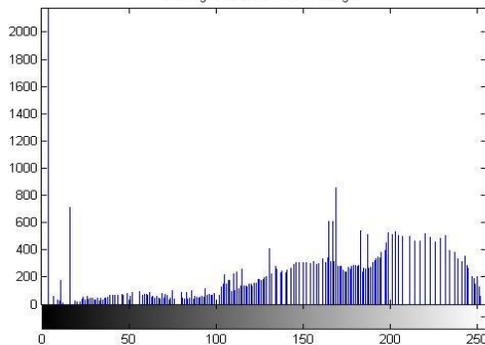
The RMSHE applied Image



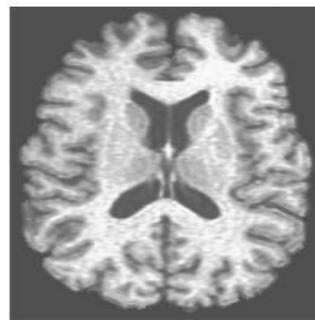
The BPDHE Image



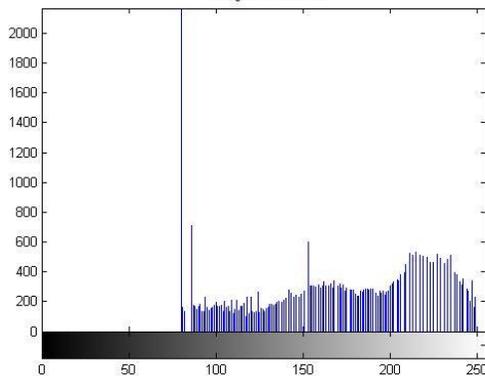
Histogram of the BPDHE Image



DSIHE of the Original Image



Histogram of DSIHE



V. CONCLUSION

The comparative analysis of different enhancement methods based on histogram processing. The enhanced images using histogram equalization by reconfiguring their pixel levels in histogram techniques. We achieve through the quality to evaluate the methods, we have used the PSNR, AMBE, entropy and contrast as parameters. These parameters show that how the results vary on applying different techniques of enhancement. DSIHE, MMBEBHE is

International Conference on Emerging Trends in Engineering, Science and Management

Sphoorthy Engineering College, Hyderabad, India

17th and 18th March 2017 , www.conferenceworld.in

(ESM-17)

ISBN: 978-93-86171-32-0

the extension of BBHE method that provides maximal brightnesspreservation. It can perform good contrast enhancement methods for MRI Brain Image.

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International Conference on Emerging Trends in Engineering, Science and Management

Sphoorthy Engineering College, Hyderabad, India
17th and 18th March 2017 , www.conferenceworld.in

(ESM-17)

ISBN: 978-93-86171-32-0

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