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A Dualistic Sub-Image Histogram Equalization Based Enhancement and Segmentation Techniques with NN for Medical Images

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ABSTRACT:-Histogram Equalization is a contrast enhancement technique in the image processing which uses the histogram of image. Segmentation of image plays a vital role in many medical imaging applications by automatically locating the regions of interest. Segmentation of image is the more crucial functions in figure analysis and processing. The segmentation results of a figure affect all the subsequent processes of image analysis. This is necessary to develop medical figure segmentation algorithms that are accurate and efficient. In this work; develop a dualistic sub-image histogram equalization based enhancement and segmentation techniques. Dualistic sub image histogram equalization (DSIHE) which divides the image histogram into two parts based on the input mean and median respectively then equalizes each sub histogram independently. Further to enhance work, use NN to present better result as compare to previous work. The proposed method has been tested and evaluated on several medical images. In paper, the medical figure is lineated and extracted out so that it can be viewed individually. Then results demonstrate that the developed algorithm is highly efficient over hierarchical grouping technique. It is valid using the performance measures such as completeness and clearness. For the implementation of this proposed work; use the GUI and NN Toolbox under Matlab software

Keywords: - Histogram Equalizations; Contrast Enhancement; Brightness Preservation; Absolute Mean Brightness Error; Peak Signal to Noise Ratio; Structure Similarity Index and Image Processing

I. INTRODUCTION

In medical imaging there is a massive amount of information, but it is not possible to access or make use of this information if it is efficiently organized to extract the semantics. To retrieve semantic image, is a hard problem. In image retrieval and pattern recognition community, each image is mapped into a set of numerical or symbolic attributes called features, and then to find a mapping from feature space to image classes. Image classification and image retrieval share fundamentally the same goal if there is given a semantically well-defined image set. Dividing the images which is based on their semantic classes and finding semantically similar images also share the same similarity measurement and performance evaluation standards. An image retrieval framework consisting of three stages; feature extraction, feature selection and image retrieval using k-nearest neighbors in the selected feature space. Neurology is the current focus of the knowledge bank. These images are scanned from the CT or MRI. Medical image segmentation is the method of labeling each voxel in a medical image dataset to state its anatomical structure. The labels that result from this method have a wide variety of applications in medical research. Segmentation is a very common method so it is difficult to list most of the segmented areas, but a general list would consists of at least the following; the brain, heart, knee, jaw, spine, pelvis, liver, prostate, and the blood vessels. The input to a segmentation process is grayscale digital medical image, (like CT or MRI scan). The desired output restrains the labels that classify the input grayscale voxels. The use of segmentation is to give preeminent information than that which exists in the original medical images only. The set of labels that is produced through segmentation is also called a label map, which briefly tells its function as a voxel by voxel guide to the original imagery. Therefore frequently used to improve visualization of medical figure and allow quantitative measurements of image structures; segmentation are also important in building anatomical atlases; researching shapes of anatomical structures; and tracking anatomical changes over time. Segmentation of medical images is a challenging issue in the field of image processing. Several literatures exist in segmentation of medical images. In our proposed technique we use the DSIHE for the image enhancement and after that apply the segmentation. After all previous techniques used; further use NN. The flowchart of the proposed segmentation algorithm is shown in Figure1. The details of each step are explained in the following section.

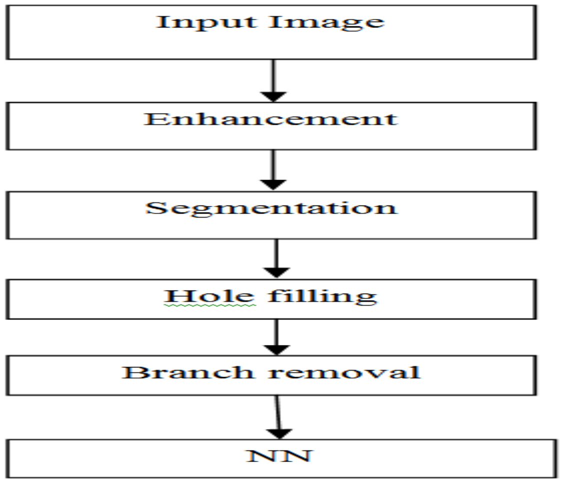

Figure1: Step of proposed work

II. INPUT IMAGE

In our proposed approach we first considered that the MRI scan images of a given patient are either color; the Gray-scale or intensity figures herein are displayed with a default size. If it is color image, a Gray-scale converted image is defined by using a large matrix whose entries are numerical values between zero and 255; where zero corresponds to black and 255 to white for instance. Thus the brain tumor detection of a given patient consists of two main stages namely; image segmentation and edge detection

III. IMAGE SEGMENTATION

The objective of image segmentation is to cluster pixels into prominent image region. This paper; segmentation of Gray level figures is used to provide information such as anatomical structure and identifying the Region of Interest i.e. locate tumour, lesion and other abnormalities. The propose technique is depend upon the information of anatomical structure of the healthy parts and compares it with the infected parts. This begins by allocating the anatomical structure of the healthy parts in a reference image of a normal candidate brain scan image.

In this paper for segmentation; use canny edge detection which is discussed below:

Canny Edge Detection: The Canny edge detector is an edge detection operator to detect a wide range of edges in images. The algorithm runs in 5 separate steps: - I. smoothing: - Blurring of the image to remove noise. II. Finding gradients: - The edges should be marked where the gradients of the image has large magnitudes. III. Non-maximum suppression: - Only local maxima should be marked as edges. IV. Double Thresholding: - Potential edges are determined by Thresholding. V. Edge tracking by hysteresis: - Final edges are determined by suppressing all edges that are not connected to a very certain (strong) edge.

IV. HISTOGRAM EQUALIZATION

Histogram equalization is a method in image processing of contrast adjustment using the image's histogram. It is a method usually increases the global contrast of many images; especially when the usable data of the image is represented by close contrast values. To through this adjustment; the intensities can be better distributed on the histogram. It is allowed for area of lower local contrast to gain a more contrast. The histogram equalization is accomplishes; this by effectively spreading out the most frequent intensity values.

V. DUALISTIC SUB-IMAGE HISTOGRAM EQUALIZATION

This is a novel histogram equalization technique in which the original image is decomposed into two equal area sub-images based on its gray level probability density function. Therefore two sub-images are equalized respectively. At end; get the result after the processed sub-images are composed into one image. The fact that algorithm can not only enhance the image visual information effectively; but also constrain the original image's average luminance from great shift. It makes this possible to be utilized in video system directly.

VI. HOLE FILLING

A hole is a background region surrounded by a connected border of foreground elements. An image that could result from thresholding to 2 levels a scene containing polished spheres (ball bearings). Dark spots could be results of reflections. Objective is to remove reflections by hole filling. The holes in the segmented image are due to noise. To eradicate this, we invert the segmented image. That is the pixels are labeled as 0's and non-image pixels are labeled as 1's.

VII. BRANCH REMOVAL

By using 'bwmorph', one can identify the branch points in a skeleton and by subtracting them from the skeleton image; the residual image is left with the different branches. Most image editors can be used to remove unwanted branches, etc., using a "clone" tool. Removing these distracting elements draws focus to the subject; improving overall composition.

VIII. NEURAL NETWORK

Artificial neural networks are composed of interconnecting artificial neurons (programming constructs that mimic the properties of biological neurons). Hence, Artificial neural networks may either be used to gain an understanding of biological neural networks; or for solving artificial intelligence problems without necessarily creating a model of a real biological system. Hence, real; biological nervous system is highly complex: artificial neural network algorithms attempt to abstract this complexity and focus on what may hypothetically matter most from an information processing point of view. Good performance (e.g. as measured by good predictive ability; low generalization error); or performance mimicking animal or human error patterns; can then be used as one source of evidence towards supporting the hypothesis that the abstraction really captured something important from the point of view of information processing in the brain. Other incentive for these abstractions is to reduce the amount of computation required to simulate artificial neural networks; so as to allow one to experiment with larger networks and train them on larger data sets.

IX. RESULT DISCUSSION

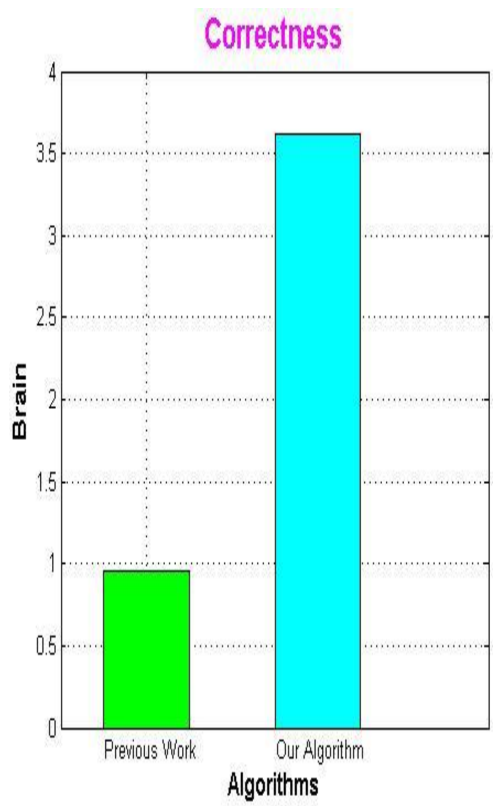

Figure 2: Graph of correctness between Brain and algorithm

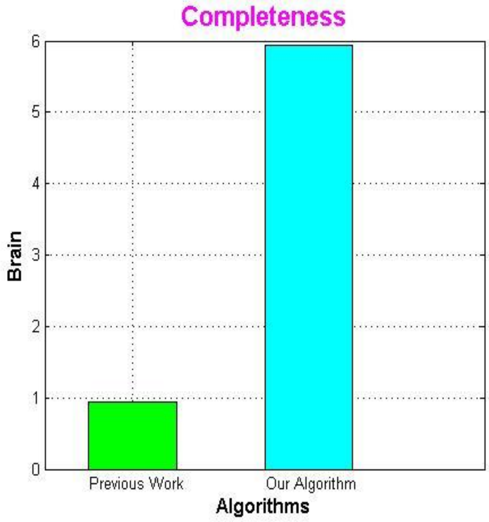

Figure 3: Graph between completeness between brain and algorithm

Table 1: Performance Evaluation of Brain images

Images	Completeness		Correctness	
Brain	Previous	propose	previous	Propose
	0.944	5.9	0.956	3.6

The table show the value of correctness and completeness of previous technique and propose technique. And the value completeness and correctness of propose techniques much better than previous technique as shown in table.

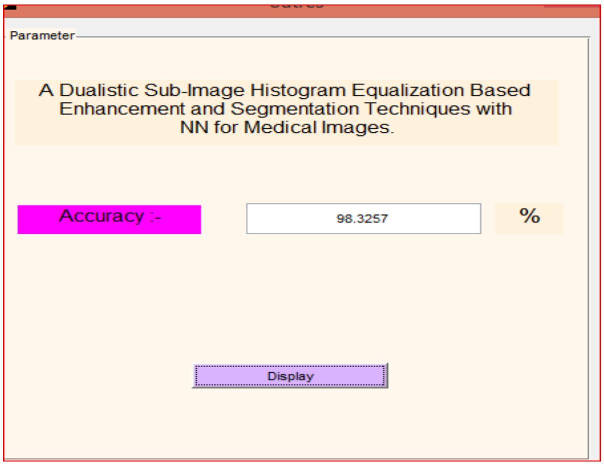

Figure 4: value of Accuracy by using NN technique

The above figure shows the result of work done. Here use DSIHE for segmentation and equalization of medical image. To enhance the previous work; use NN technique to give better result as compare to previous result. Here accuracy reaches to 98.3257% by using NN.

X. CONCLUSIONS

This paper will present a complete and fully segmentation and enhancement of medical image by using DSIHE technique. Here we apply enhance the image after that segmentation done on that image. After these processes; hole filling and branch removal is done respectively on the medical image. To further enhance work and produce better result use NN technique. The NN algorithm enhance both parameter value i.e. correctness and completeness and also show better accuracy as compare to previous technique.

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