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SKIN CANCER DETECTION USING LOCAL AND GLOBAL CONTRAST STRETCHING

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Abstract - *This paper aims to identify efficient image enhancement techniques in order to detect preliminary effect of skin cancer. The different techniques that can be used are adaptive unsharp masking, adaptive histogram equalization, adaptive neighborhood technique and local and global contrast stretching. The main technique which we are going to focus is local and global contrast stretching. We consider this technique for its advanced output. In this we present result using this technique on color and gray scale image. The result is obtain by scanning the input image through the database and it calculates the parameters. Through this calculated parameters we can find out whether the image is cancerous or not.*

Key Words: **Image Enhancement Technique, Skin cancer, Unsharp Masking, Adaptive histogram equalization, Adaptive neighbourhood technique, Local and Global Contrast Stretching.**

1. INTRODUCTION

Most of the skin cancer is caused in summer. One million people are detected with skin cancer every year. 70,000 people get melanoma that is deadliest form of disease. There are two type of skin cancer melanoma and non-melanoma.To obtain required quality through various method image enhancement technique is used for processing of digital image. In order to detect the preliminary effect of skin cancer efficient image enhancement techniques are used. Image enhancement technique provide improvement of object detection and identification under low illumination condition. This is used to make an image lighter and darker. Contrast enhancement is most common method for enhancing the image. The objective of image enhancement is for the improvement of visual quality and clarity of image. Cancer detection is process of recognizing the early stages of cancer and possible warning sign of the disease. Early action can help to diagnose the disease as soon as possible for best recovery of cancer. It can be detected with the help of mobile application. It will be very easy for patient as they scan the images of effected part and with the help of database it will help detect skin cancer.

2. LITERATURE SURVEY

1. Dr Vijay Dhir and Sanjeev kumar Review of various Contrast Image Enhancement Technique. This paper studies various contrast image enhancement technique. This various technique will going improve the contrast of an image.

2. Jaspreet Kaur and Amita Choudhary Comparision of Sevral Contrast Stretching method on Acute Leukemia Image. This paper focuses on various contrast stretching methods such as local ,global ,partial, bright and dark contrast stretching methods. The comparison of all this method studied in this paper to nd out which one is best to enhance and study acute leukemia image in better way.

3. Archana Singh and Neeraj Kumar A Comprehensive method for Contrast Image Enhancement based on Local and Global Contrast and Local standard Deviation. This paper studies global and local method for Contrast image Enhancement .This paper study this two method in which researcher found that this two are not sucient to enhance an image when image has some contrast area and it is not possible to perform any type of transformation on it. This paper proposed and study a novel method to remove the divided by zero condition that arises due to local standard deviation of that contrast area to enhance the image in more suitable way.

4. Prasad Nagelli, Venkath Reddy, BTR Naresh Reddy Blurred Image Enhancement using Contrast Stretching ,Local Edge Detection and blind decovolution. This paper is research work to avoid the problem which will occur in blurred image .Blurred image is a common problem observed in the situation when object is in motion or when we will going to shoot a video. Three method are presented here in this paper to avoid the problem of blurred image. Contrast stretching process is used to deblurred image. Local edge detection method is applied on original as well as blurred image. Both the image edges are fused to obtain sharp edges of an image as an output. Fused image distortion is unknown so blind deconvolution technique is applied to obtain final output

3. LOCAL AND GLOBAL CONTRAST STRETCHING

The enhancement techniques are developed in order to increase the contrast of an image. Generally, an image can be enhanced by spreading out the range of scene illumination. This procedure is called contrast stretching. Contrast

normalization is a simple image enhancement technique that attempts to improve the contrast in an image by stretching the range of intensity values it contains to span a desired range of values, the full range of pixel values that the image type concerned allows. Contrast stretching changes the distribution and range of the digital numbers assigned to each pixel in an image. This is normally done to accent image details that may be difficult for the human viewer to observe. Our main goal in this paper is to apply a contrast enhancement technique to recover an image from blurred images, also improve image quality of it.

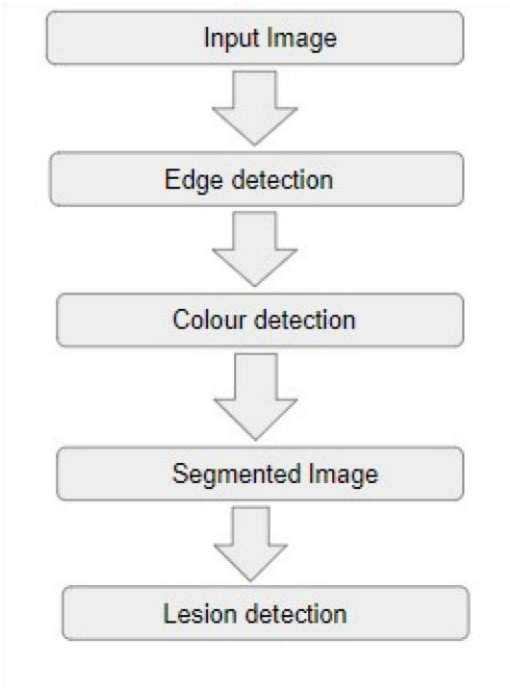

Fig -1: Block diagram of local and global contrast stretching

4. PROPOSED THEORY

The proposed theory for melanoma and non-melanoma skin cancer detection by using image enhancement techniques is shown in following flow diagram. The input image of wound which we want to detect where skin cancer is present or not is given to the Graphical User Interface (GUI).GUI has main function which integrates multiple functional module. This functional module can be feature extraction module, noise adding and noise denoising module. We are enhancing the image in following process:

1. Edge detection
2. Color detection
3. Segmented image
4. Lesion detection

After going through the above process we get various result which is useful for prediction of image which is cancerous or noncancerous.

A. Edge Detection

In edge detection, first we take input which is in rgb format converted to gray scale image. Gray scale image have many shades of gray in which each pixel is a single sample represent amount of light gives information about intensity. This intensity lies between 0 to 255 range. Black shade has weakest intensity i.e. 0 and white shade has strongest intensity up to 255 range. Gaussian filter is apply to gray scale image for smoothening. In Gaussian filter, with the help of sigma factor, we get smooth image which is noise free. This process increases standard deviation of that image. Smooth image is converted to binary image which pixels are only in black and white color by using morphological operator we can clear all the holes in image. We get number of pixels of black color as well as white color. We are using canny edge type of edge detection in which it will extract only useful information from different vision of object and reduces unwanted data.

B. Color Detection

In second process of color detection, Hue saturation value(HSV) model is apply after edge detection in which any object with any color can be detected and reduces light intensity from outside.

C. Segmented Image

Image segmentation is the process of one digital image into multiple segmented parts (that means set of pixels called as super pixel) .Segmentation is used to locate only particular object and edges of an image.

D. Lesion Detection

Lesion is a term to detect whether the image is cancerous and non-cancerous.

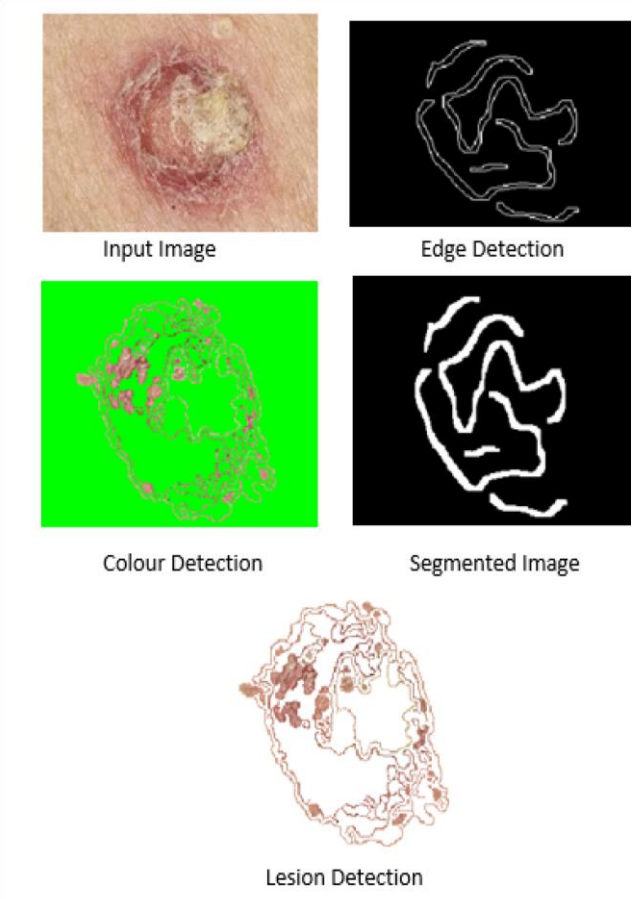

Fig -2: Result of proposed theory

5. SOFTWARE IMPLEMENTATION

Calculated parameters	Fig (2)
L1 NORM	16209
L2 NORM	127.3146
MEAN DEVIATION	0.4371
ASYMMETRY	1
BORDER	2
DIAMETER	27.8511
COLOUR	2
SKEW	0.7590
KURTOSIS	1.5761
PSNR	3.1796
TDV	2

Fig -3: Calculated Parameters of figure 2

A. L1 NORM

L1 Norm is the area of non-overlap region along major axis of lesion B.

B. L2 NORM

L2 Norm is the area of non-overlap region along minor axis of lesion

C. MEAN DEVIATION

Mean Deviation can be calculated by the formula below,

$$\mu T = \sum_{i=0}^{L-1} i p_i$$

where, pi= Probability of occurrence of gray level i.

D.ASYMMETRY

Symmetry is one of the very important features in image analysis. If the half part is missing or noisy, then by using symmetry feature full pattern can be obtained and rid the noisy part. Degree of symmetry can be checked using the Asymmetry Index. It is calculated using below formula,

$$AI = \frac{1}{2} \sum_{k=1}^{2} \frac{\Delta Ak}{A_L},$$

E.SYMMETRY INDEX

Symmetry index=A1+A2/Ar

A1=Area of non-overlap region along major axis of lesion

A2=Area of non-overlap region along minor axis of lesion
Ar=lesion implementation

F.BORDER IRREGULARITY

There are three different measures such as compact index (CI), fractional dimensions and edge variations

CI=2PL=4AL-[1]

where, PL=perimeter of lesion

AL=Area of lesion

G. DIAMETER

Melanoma tends to grow larger than common moles, and especially the diameter of 6mm. Because the wound is often irregular forms, to find the diameter, draw from all the edge pixels to the pixel edges through the midpoint and averaged.

H. COLOUR

The emergence of color variation in the color is early sign of melanoma. Because melanoma cells grow in grower pigment, they are often colorful around brown, or black, depending on the production of the melanin pigment at different depth in the skin. The descriptors of color are mainly statistical parameters calculated from different color channels, like average value and standard deviation of the RGB or HSV color channel. Here color variance of the RGB image has been calculated using HSV channel.

I.SKEW

It was used to detect edges in dark objects on white background, having a sign change at luminance edges.

J. KURTOSIS

It detects if a distribution is flat or peaky, and later was associated to perceptual aspects of sparse coding. It is often considered as a measure a sparsity, and used in early deconvolution methods.

K. PEAK SIGNAL TO NOISE RATIO (PSNR)

PSNR is used to measure the quality of reconstruction of lossy and lossless compression

L.TOTAL DERMOSCOPIC VALUE (TDV)

TDV= (A*1.3) + (B*0.1) +(C*0.5) + (D*0.5)-[2]

where, A=Asymmetry

B=Border

C=Color

D=Diameter

6. CONCLUSION

The basic techniques of image enhancement by providing the result of different parts of skin affected by skin cancer. The images are differentiated on the basis of different parameters by concluding the image size and RGB values with the enhanced form of the original image. The main idea is to provide enhanced images through local and global contrast stretching technique based on well-defined parameters so that it can be helpful for doctors and other medical practitioners to conclude the result and use this technique to cure cancer

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