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Skin Cancer Detection

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Abstract:- Skin cancer refers to the common term given to the condition of excessive uncontrolled growth of certain strange skin cells. It can occur, whenever the unrepaired DNA damages to the skin cells trigger any sort of mutations, or any other kind of dangerous genetic defects, that can lead to the multiplication of the skin cells and formation of malignant tumors. Image processing, is considered to be a commonly used domain for skin cancer detection using the appearance of the affected area on skin. An early and fast detection of skin cancer is necessary and can save the patient's life. With the new and improved technology, an early detection of skin cancer is possible at the initial stage.

The input in our proposed system is the image of the skin lesion on which we wish to apply the image processing technologies, to have a conclusion about the detection of skin cancer. The lesion image tools, which are used to analyse the given image for skin cancer detection, check for various melanoma cancer parameters such as Asymmetry, Border, Colour, Diameter (The ABCD rule) by analysing the texture, size, colour and shape used for image segmentation and feature extraction. These extracted features of the lesion image are then used in detecting the presence of skin cancer.

Keywords:- *Skin Cancer, Image Processing, ABCD Technique.*

I. INTRODUCTION

Nowdays, skin cancer is commonly viewed and considered to be one of the most dangerous forms of body cancers identified in human beings. Skin cancer has various types, out of which melanoma is considered to be the most unpredictable, dangerous and common type of cancer. It can be considered as deadly, and though it constitutes of a value of only 4% of the total types of skin cancer, it can be held accountable for 75% of the deaths caused due to skin cancer.

Image processing can be seen as one of the most common and widely used methods for skin cancer detection. 'Dermoscopy' is a type of examination technique for the skin, that supports the cause of the incident light beam on the surface and the oil immersion for the efficient and clear investigation of skin structures.

Skin cancer arises due to skin lesions. They arise because of the growth of some abnormal or unusual cells in the skin that can even invade or spread to the other parts of the patient's body. Melanoma can be easily termed to be the most aggressive and common type of skin cancer that has the ability to spread easily from one part of the body into other parts of the body. Signs of this kind of cancer usually include a mole or a scar, that has changed itself in its size, colour, shape, texture etc. and has irregular edges, multi-colours etc. Generally, it is often itchy and bleedy too. It has the capability of spreading from one part to another and can even spread into the major organs of the body if not taken care of.

II. EASE OF USE

Around 20% - 30% of melanoma cancers arise from skin moles. Therefore, People having lighter skin have higher risks when compared to those having poor immune functions. Limited exposure to ultraviolet (UV) radiations and using sunscreen lotions are considered as some of the effective methods for preventing skin cancer. Treatment of skin cancer can be done by surgically removing the mole or sometimes involving radiation therapy for the skin, or medications like fluorouracil.

Treating melanoma cancer involves all kinds of skin surgeries, chemotherapies, radiation therapies and sometimes, even targeted therapies. Moreover, Melanoma has a much higher survival rate among all the other different types of cancers, with over 86% of people in the United Kingdom and over 90% in the United States of America surviving more than 5 years after having the disease.

Most of the times, melanoma moles consists of a lot of different colours, textures and shades. Some melanoma scars are pink, red or even fleshy in colour. They are known as amelanotic melanoma moles and are considered to be more aggressive than the rest of the moles. Some warning signs of malignant melanoma include change in the size, shape, texture, diameter, colour or elevation of the mole. Other symptoms may include pain, itching, ulceration, redness or bleeding. Skin cancer can be prevented by using a number of preventive measures, like decreasing indoor tanning and sun exposure, using sunscreens, and avoiding tobacco products. Oxides such as zinc oxide and titanium oxide, are mostly used in sunscreens to ensure protection from the UVA as well as UVB radiations. Eating certain healthy foods can prevent sunburns. For cancer diseases, radiation therapy, chemotherapy and cryotherapy can control the disease. These therapies however, may have lower overall cure rates than certain other types of surgeries.

III. METHODOLOGY

➢ *Proposed Architecture*

The input given to the system will be the skin lesion image and will be given for preprocessing. The preprocessing techniques are image scaling, RGB to grayscale conversion, grayscale conversion to binary conversion, etc. Background Subtraction, Edge Detection, Masking, Feature extraction etc. are used for segmentation. The extracted features can be tested for cancer. The classification of cancer will be helpful in finding whether a mole is cancerous or not.

➢ *Equations Pre-processing part:*

Median filtering is considered fit to be used for the pre-processing part in the system. It mainly focuses on the elimination of all types of salt and pepper noises in the images of the scars of skin . These scars in the skin have to be tested for skin cancer. Median filtering is described as a general technique where the image window's centre value is replaced by the median of the 8 neighbourhood points' pixel values. It is viewed as a kind of nonlinear filter. It can be also described as a sliding window spatial type of filter and can also be termed as the most common type of smoothing filter.

The skin lesion images are given to the computer diagnostic system as an input and can be captured in any form of a lighting condition or by using any camera type. Hence, it needs to pre-process before any further execution. Here, the pre-processing involved in this process is image resizing (or scaling) and brightness modifications, which can be done by compensating the non-uniform illuminations of the given lesion image.

➢ *Image Scaling:*

Image scaling is defined as the process of resizing any given digital image. The size of the image is sometimes either reduced or enlarged depending upon the type of operation which is to be performed, these pixels that form the images become highly visible, making the images soft to a limited extent.

RGB to grayscale image:

The rgb2gray command in MATLAB converts the given true colour images RGB to the grayscale intensity images, by eliminating the saturation information.

➢ *Grayscale to Binary Image:*

The Im2bw command in MATLAB is used to convert the given grayscale images to their respective binary images. The output image obtained tends to replace all the given pixels of the input image with appropriate luminance exceeding the levels with the value 1 (white) and substituting all the other left out pixels with the value 0 (black). When the level is not defined, then im2bw command automatically tends to use the value 0.5 as a default value.

The Grayscale intensity of RGB image can be given by
= 0.299 R + 0.587 G + 0.114 B

➢ *Segmentation*

Image segmentation is defined as the process of segregating or separating the given input image into multiple parts, which can be further used to identify other objects or other important information in the lesion image.

➢ *Background Subtraction:*

Background subtraction, or also called blob detection, is also an important technique in the areas of image processing and medical imaging where an image's foreground is extracted for the further processing of the image.

➢ *Edge Detection:*

Edge detection can also be seen as a vital image processing strategy or concept to catch all the boundaries of objects in images. It works by detecting the discontinuities in the certain levels of brightness.

The horizontal gradient for the input matrix image is given by:

$$B(j,k) = A(j,k+1) - A(j,k)$$

Where A is used to denote the array of a matrix A and B denotes the new array of matrix that contains the gradient values from A.

The vertical gradient for the input matrix image is given by:

$$B(j,k) = A(j+1,k) - A(j-1,k)$$

➢ *Masking:*

Masking is the technique that involves setting up the input image's pixel values to zero, or maybe some background values initially. It can be used to identify the lesion area from the skin images. The masked output image obtained contains the skin lesion only, which makes it easier to detect skin cancer.

➢ *Feature Extraction:*

The foremost type of features for the Melanoma Skin Cancerous lesion, are the Geometric Features. Hence, we can use this idea to extract the most vital Geometric Features of the segmented skin lesions. Here, we use the classic type of geometry features (Area, Diameter, Irregularity Index) found from the segmented image, containing the image of the skin lesion, which is furthermore analysed to extract these geometrical features.

IV. RESULTS

➢ *Figures and Tables*

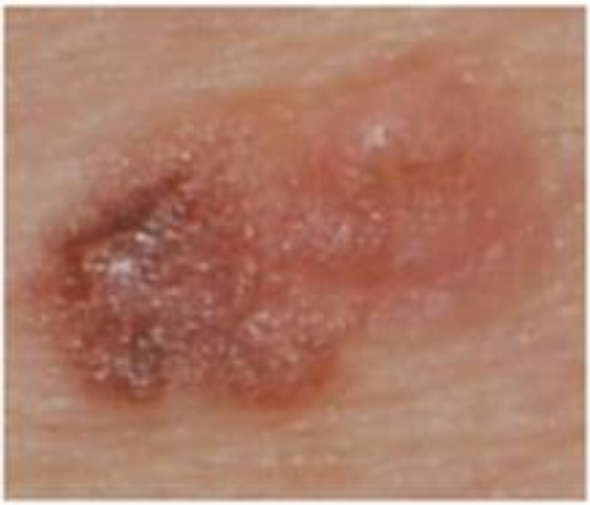

Fig 1:- Skin Cancerous Mole

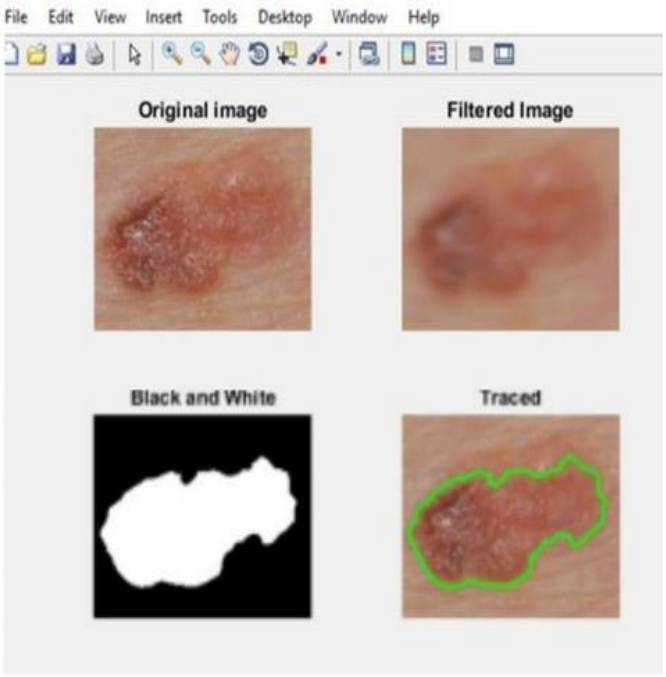

Fig 2:- Detected Cancer Outputs

- Original Image: First image is the input image that we used as an input.
- Filtered Image: Filtered image is obtained after applying median filter on the input image. Black and White Image: Filtered image is converted into a black and white image.
- Traced Image: The image, which detects the skin cancer.

V. ANALYSIS

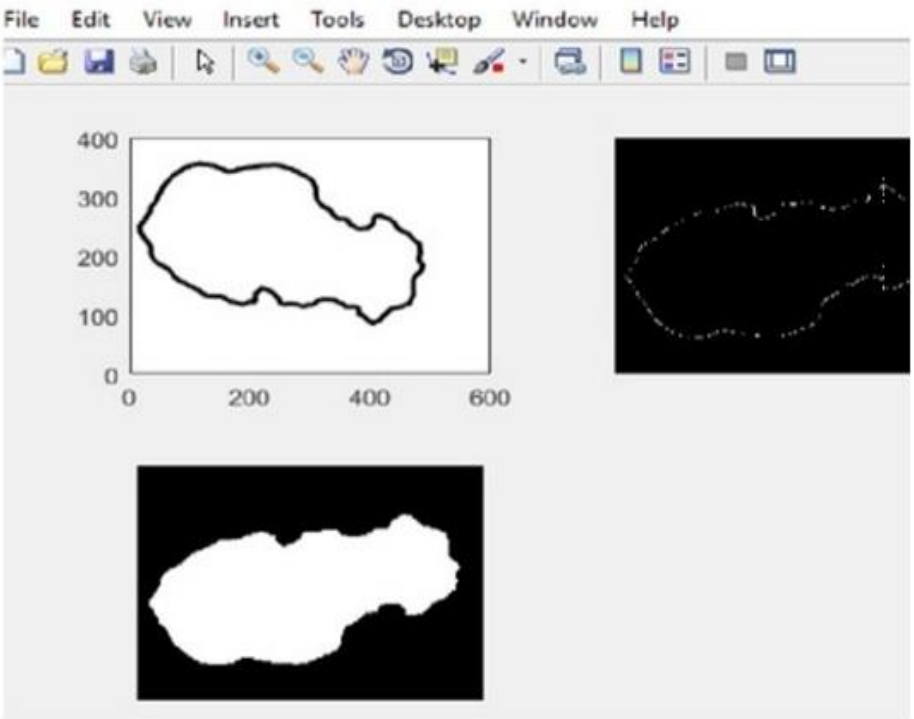

Fig 3

- Asymmetry: Is asymmetric.
- Border Irregularity: The edges are ragged or blurred. Color. The color (pigmentation) is non- uniform.
- Diameter: The size of the mole is greater than 1/4 inch (6 mm). Thus the skin lesion examined is Cancerous.

VI. CONCLUSION

In the recent times, skin cancer has multiplied to a great extent and it has becomes very important to detect these skin diseases at its initial stages. In order to solve these issues, we can use the method of image segmentation and image processing to detect early signs and symptoms of skin cancer. We have used a matlab code to detect the same, using abcd rule (A– Asymmetry, B – Border, C – Colour, D – Diameter).

We can conclude from the statistical results that the above suggested system can be used by patients and doctors, particularly physicians and doctors to diagnose skin cancer , exactly at early stages. This can be extremely useful for the rural area people where the experts in the diagnosis field may not be physically available in a good number. Since this tool is made more feasible and robust for the digital images acquired in any conditions, it would be able to deliver the purpose of diagnostics of the Melanoma Skin Cancer. In the future, we can also develop a computer algorithm for skin cancer diagnosis using Support Vector Machine, which is also an important and fast emerging technology nowadays.

REFERENCES

[1]. Pehamberger H, Binder M, Steiner A, Wolff K. In vivo epi luminescence microscopy: improvement of early diagnosis of melanoma. J Invest Dermatol, 1993.
[2]. A. Bono, S. Tomatis, and C. Bartoli, The ABCD system of melanoma detection: A spectrophotometric analysis of the asymmetry, border, colour, and dimension, "Cancer", vol. 85, no. 1, pp. 72–77, January 1999.
[3]. Bafounta ML, Beauchet A, Aegerter P, Saiag P. Is dermoscopy (epi luminescence microscopy) useful for the diagnosis of melanoma, Results of a meta-analysis using techniques adapted to the evaluation of diagnostic tests. Arch Dermatol,2001.