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SURVEY AND SEGMENTATION OF SKIN LESION

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ABSTRACT
Skin cancers are the most common and hazardous form of cancers in humans. It is very important to detect such types of cancer at an earlier stage. Early detection helps to save life. Early detection of skin cancer is possible with the advancement of technology. There are three main types of skin cancer such as Melanoma, Basal and Squamous cell Carcinoma. Basal cell carcinoma and squamous cell carcinoma are the two most common types skin cancer called non-melanoma skin cancer. Melanoma which is called malignant melanoma is rarer and most serious skin cancer needs to be detected at early stage as this skin cancer directly lead to the death of a person. Early detection of Melanoma skin cancer is completely curable. The aim of this study is to provide an efficient way to segment the skin cancer images. For this purpose a novel method is proposed for the segmentation of skin lesion from unaffected skin region in an image.

KEYWORDS: Melanoma, Basal and Squamous Cell Carcinoma.

1. INTRODUCTION

In recent years, skin cancer is the most common form of human cancer. It is estimated that over one million new cases occur annually. Much exposure to ultraviolet (UV) rays is the main reason of the skin cancer. The skin cancer is the uncontrolled growth of skin cells in the body. Abnormal change or difference in a tissue or structure such as the skin is called lesion. Too much ultraviolet radiation from the sun or sun beds causes of damage the DNA of skin. If enough DNA damage builds up over time which leads to the skin cells multiply rapidly and malignant tumours form. Some skin cancer spread and also affects the nearby tissue cells[1]. Sun is the most common cause of skin cancer. But it is not only factor that is responsible for developing this cancer on the skin exposed to sunlight. Other factors like environmental threats, radiation analysis and even inheritance could play a vital role for this type of cancer. Although anyone can get skin cancer, the risk is greatest for people having fair skinned with light coloured hair and eyes or those more likely to burn than tan as their skin makes less of the protective pigment called melanin. People with black skin are less likely to get skin cancer, but they can be at risk particularly in areas not exposed to the sun, such as the soles of the feet and palms of the hands.

A genetic family history of skin cancer, an excessive sunlight or sunburn, lived in large or with year-round sunshine, received radiation medication are the causes of skin cancer[2]. The signs of skin cancer including melanoma, often start as will change the color of the skin. They are usually mixed color (pink, red and brown). There are three types of skin cancer to be occurred. They are Basal cell cancer, Squamous cell carcinoma and malignant Melanoma tumor. The first two types do not spread quickly, but third one spreads quickly. Melanoma is much less common than basal cell and squamous cell skin cancer, but it is far more dangerous. However, if it is not found early it is much more dangerous. Women are mostly affected than man due to this type of cancer. It causes 75% of deaths which are related to skin cancer. About 160,000 new cases of melanoma yearly has been diagnosed by worldwide, doctors. Complete removing of melanoma at earlier stage while it is still small and thin enhance the high chance of cure. The main design issues for the proper characterization of skin lesions of malignant melanoma includes image acquisition, image processing and analysis, feature extraction, and the classification methodology.

2. PROPOSED METHOD AND RESULTS

The main aim of this study is to automatic detection, segmentation and extraction of the skin lesion. Presently

prospects of automatic image analysis method has taken a great attention in entire clinical application for its significant information about a skin lesion and also helpful as an early warning tool for the detection purpose.

This paper presents an algorithm for detection of skin cancer.

Preprocessing: To obtain the enhanced image pre-processing is to perform on original image. The skin cancer images usually contain fine hair, noise and air bubbles[3]. Median filter is used to remove the noise. Median filter is a non-linear digital filtering technique which reduces the variance of the intensities in the image and smoothers the image by utilizing the median of the neighborhood. The main advantages of median filtering are, it is not affected by individual noise spikes, impulsive noise is also eliminated quite well, it does not blur edges much and can be applied iteratively. The gray image and filtered image are merged together to enhance the image quality. Segmentation is one of the important steps in cancer detection. Thresholding is used for segmenting the skin lesion. Depending on the threshold value segmentation procedure has been done and whole image is converted into binary image.

Algorithm for Detecting Skin Lesion

Input: Original color Image.
Output: Skin lesion portion of the image.
Step 1: Color image is converted in to gray scale image.
Step 2: Different kind of noises present in the image in form of bubbles and hairs etc. Accuracy in classification noise removal is the important step. Median filter is used to remove the noise by minimizing the influence of small structures like thin hairs and small air bubbles. Median filter has been passed through on the image not only removing noise and other spike in the image but also blurring of edges. Contrast enhancement sharpens the image border and edges that improve the level of accuracy for segmentation.
Step 3: Enhance image has been converted in to binary image.
Step 4: Separate the skin lesion from healthy part of skin by thresholding method.
Step 5: Different kind of features are extracted for characterization of skin lesion as malignant melanoma or benign skin lesion. ABCD rule[4] has been used to diagnosis for melanoma skin cancer.

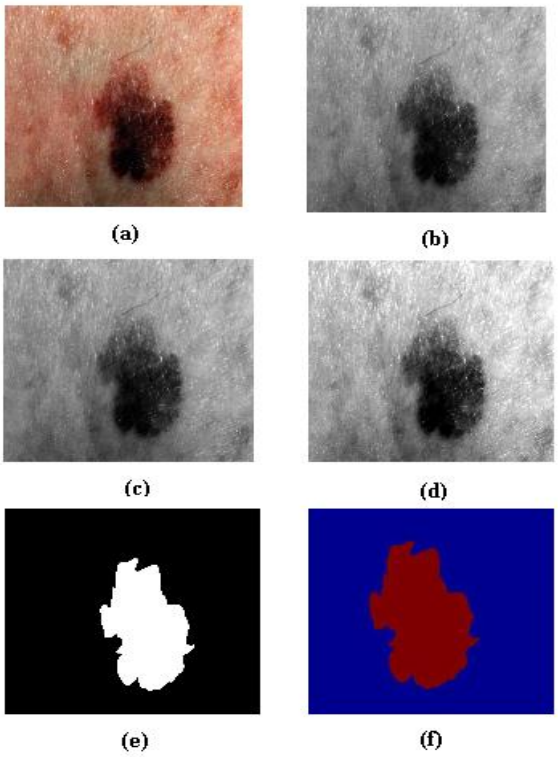


Fig 1 (a) Original Image, (b) Gray scale Image, (c) Filtered Image, (d) Enhanced Image (e) Thresh-hold segmentation, (f) Colour Segmentation

Feature Extraction: Features are extracted from the segmented images. The extracted features like texture, colour, and shape are given as input to the classifier to characterize the skin lesion either it is malignant or benign. ABCD rule of dermoscopy is used for the diagnosis the melanoma skin cancer.

Asymmetry

A normal mole is round that means symmetrical, whereas a suspicious mole is uneven. Asymmetry means one half of the mole is different from the other half.

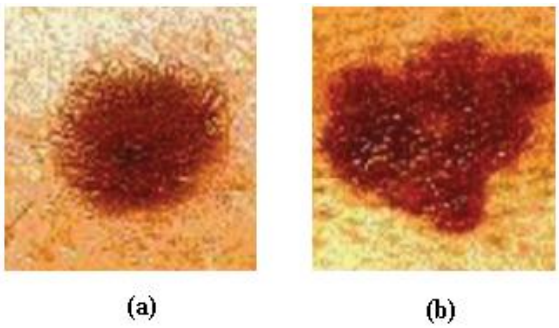
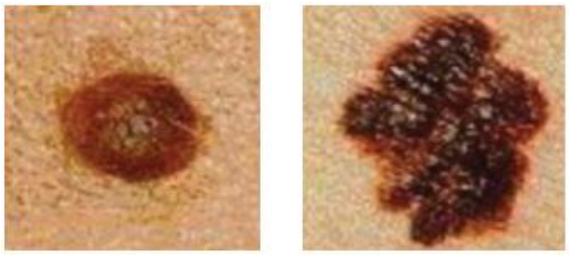


Fig 2(a) Symmetrical Mole (b) Asymmetrical Mole

Border

Melanoma lesions often have uneven borders where as normal mole has a clear-cut border with the surrounding skin.

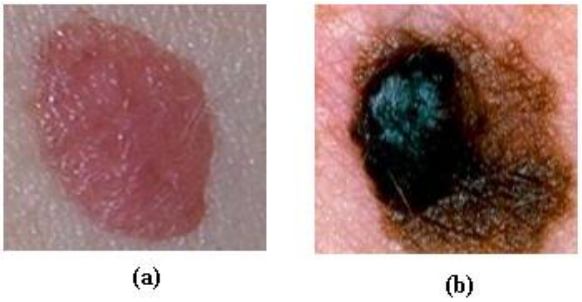


(a) (b)

Fig 3(a) Even Border (b) Uneven Border

Color

Normal moles are usually a single shade of color but cancerous mole consists of mixture of color like red, white, blue, brown, purple, or black.

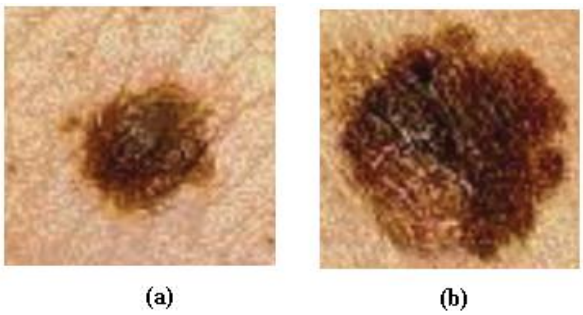


(a) (b)

Fig 4(a) Single Color (b) Multiple Color Mole

Diameter

If the diameter of the mole is greater than 6 mm (the size of a pencil eraser) then this may be suspected as cancerous. Normal moles are usually less than 1/5 in (5 mm) in diameter.



(a) (b)

Fig 5(a) Normal Mole (smaller than 6 mm), (b) Abnormal Mole (larger than 6 mm)

Evolving

A mole or skin lesion that looks different from the rest or if it is changing in size, shape and colour is called evolving.

Fig 6(a) Mole changing in Size, Shape, Colour

Total Dermoscopic Score

TDS value is calculated after the value of four components ABCD is found.

The formula is given as follows:

TDS = A*1.3 + B*0.1 + C*0.5 + D*0.5

Where A= Asymmetry Index

B= Border Irregularity

C= Colour Variegance

D= Diameter

It will be treated as benign (noncancerous) skin lesion when the TDS index is less than 4.75, consider to be suspicious skin lesion if the index lies between 4.75 and 5.45, it is malignant melanoma (cancerous) skin lesion, if TDS Index is greater than 5.45 [5] [6] [7].

3. CONCLUSIONS

In this paper a computer based early skin cancer detection system has been proposed. Digital images of skin lesions have been investigated in order to accomplish an efficient way to identify skin cancer at an early stage without performing any unnecessary skin biopsies. Early, fast and effective detection is important to the patients of the skin cancer. Earlier detection of the skin cancer has the highest cure rates and most cases it offers quite simple treatment. This work presents a method for the segmentation of skin cancer images from healthy skin using thresholding approach. To eliminate the unwanted structures like hair from the image preprocessing technique including filtering and image enhancement methods are used. Using Stolz algorithm skin cancer recognition system has been explained. Lesions can classified as benign, suspicious and melanoma by calculating the TDS value.

REFERENCES

1. Yana Goncharova, Enas A. S. Attia, Khawla Souid, and Inna V. Vasilenko, "Dermoscopic Features of Facial Pigmented Skin Lesions," Hindawi Publishing Corporation, Dermatology, 2013; 1-7.
2. Iris Zalaudek, M.D, Aimilios Lallas, Elvira Moscarella, Caterina Longo, H. Peter Soyer, Giuseppe Argenziano, "The dermatologist's applications—traditional and new applications of dermoscopy," Dermatol Pract Concept, 2013; 3(2): 67-71.
3. J. Abdul Jaleel, Sibi Salim, Aswin.R.B,Artificial Neural Network Based Detection of Skin Cancer, "International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering" 2012; 1(3): 200-205.
4. Ilias Maglogiannis, Charalampos N. Doukas Overview of Advanced Computer Vision Systems for Skin Lesions Characterization, IEEE Transactions on Information Technology in Biomedicine 2009; 13(5): 721 – 733.
5. Md.Amran Hossen Bhuiyan, Ibrahim Azad, Md.Kamal Uddin, Image Processing for Skin Cancer Features Extraction, International Journal of Scientific and Engineering Research 2013; 4(2).

6. ChenyangXu, Student Member, IEEE, and Jerry L. Prince, Snakes, Shapes, and Gradient Vector Flow "IEEE Transactions on image processing", 1998; 7(3): 359-369.
7. Maciej Ogorzaek, Leszek Nowak, Grzegorz Surowka and Ana Alekseenko, Modern Techniques for Computer-Aided Melanoma Diagnosis, Jagiellonian University Faculty of Physics, Astronomy and Applied Computer Science Jagiellonian University Dermatology Clinic, Collegium Medicum Poland.