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Recognition and Investigation of Skin Cancer using Morphological Operations

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Abstract-: ***In today's world Skin cancer (Melanoma) has become a very common disease. Melanoma is the cancer cells which exhibit as the abnormal cells from skins that can be developed in any other parts of the body. Over exposure to UV rays is the main cause for Melanoma. Other way that causes Melanoma is the tanning beds. Skin cancers are classified into three different types as follows: Basal-Cell skin Cancer (BCC), squamous-cell skin cancer (SCC) and melanoma. Melanoma causes enormous and irreparable damage. Symptoms incorporate a mole that can change in its volume, contour, and color. The effective way to prevent Melanoma is by decreased exposure to UV rays and tanning beds. The stipulated approach followed by dermatologist is rightful supervision of the Skin. As this approach is time and power consuming, a new feature based classification for the detection of skin in various features of images as described in this paper. This approach reduces the professionals work. The morphological operation is used to differentiate the cancerous cell from the image .The skin texture features are obtained from processed image and used for classification of images as malignant and non-malignant.***

Keywords: ***Morphological operations, TDS, Melanoma, Features***

I. INTRODUCTION

The outermost, protective organ of a human body is the skin, which helps in protecting the muscles, bones and all the major parts. Even a diminutive change in skin will affect all the other important parts of a human body. Since skin is highly exposed to the atmosphere, UV rays and tanning beds, chances are higher to get easily infected. In order to get rid of it, it is essential to concentrate on sin diseases. The infected area on the skin is said to be as lesion area [1][2]. Changes in skin colour, texture and size signifies scientific signs of various diseases like varicella, Melanoma, etc. Nowadays, Computer aided analysis is used by the medical practitioners. For an unpracticed dermatologist, prior recognition of skin ailment is a difficult task .

II. LITERATURE REVIEW

Pattern classification of dermoscopy images [3] was proposed by Abbas et al., in the year 2013. Celebi et al., (2013) proposed classification approach of pigmented skin Without any physical contact it is possible to do the analysis for skin cancer detection using digital image processing. lesions. Evolution strategy (ES) based segmentation algorithm was discovered by Yuan et al., in the year 2008 to identify lesion area. Later, in 2003 two approaches were proposed by Rajab et al., to classify the skin segmentation issues. An verge resolute by using Iso- data algorithm with section based segmentation, which is being the first method. Second method segmentation is completely defined on neural networks. Wang et al., (2010) proposed a method for regular segmentation using watershed-based algorithm in dermoscopy images[4]. In 2010, for consequently dividing skin injuries, Wighton et al., proposed a methodology using arbitrary walker calculation. Later, Li et al., in 2010 utilized a technique to enhance division of skin injury into pigmented and non-pigmented. By the year 2010, Komati et al., introduced an upgraded form by joining the established JSEG calculation with nearby fractal [5][6]. Shena et al., (2012), exhibited a robotized strategy by utilizing an arrangement of dermoscopy pictures for melanoma determination[7]. Later by the year 2013, Aswin et al., proposed a PC supported framework utilizing ANN classifier. Mahmoud et al., presents a technique using neural framework classifier with wavelet and curvelet for modified skin infection portrayal structure in 2013. It is clear in the writing that the majority of the examination works depends on just 3 kinds of sicknesses to be specific melanoma, squamous cell and Basal cell. The following section presents the dataset description. Proposed model is explained in Section 3. Feature Extraction and TDS calculation is described in Section 4 and Section 5. Finally, section 6 describes conclusion part.

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Description of Dataset:

An very essential factor required for any work is to think and test the framework. Due to high demand for this, we have given our own information's by gathering the pictures through browsing.These are the genuine nature pictures with dynamical goals. As pictures are gathered through web, they uncover extensive intra class varieties with minor varieties. Such affectability is required to shape positive genuine pre process system like sifting.

Along with this work, we will in general pick totally extraordinary classifications of skin infections: skin malignant growth, Basal cell and epithelial cell [8]. Figure 2.1 demonstrates a portion of the examples from these distinctive classes of skin ailments. A sum of 140 pictures is gathered out of which 50 are melanoma, 25 are Basal cell and 35 are Squamous cell. It is observed from figure 1, that pictures inside a gathering are defined with huge variety and furthermore it is very difficult to separate among pictures the other varieties because of the likeness among the classes.

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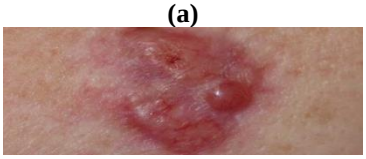
(a)



(b)

(c)

Fig.1. (a) Melanoma (b) Basal Cell (c) Squamous cell

III. PROPOSED METHODOLOGY

A. System Description :

The defined approach is developed to categorize the skin lesion based on the system/computer vision to classify them with removal of selective set of options from skin diseases. The summary of the projected technique is shown below in the figure:

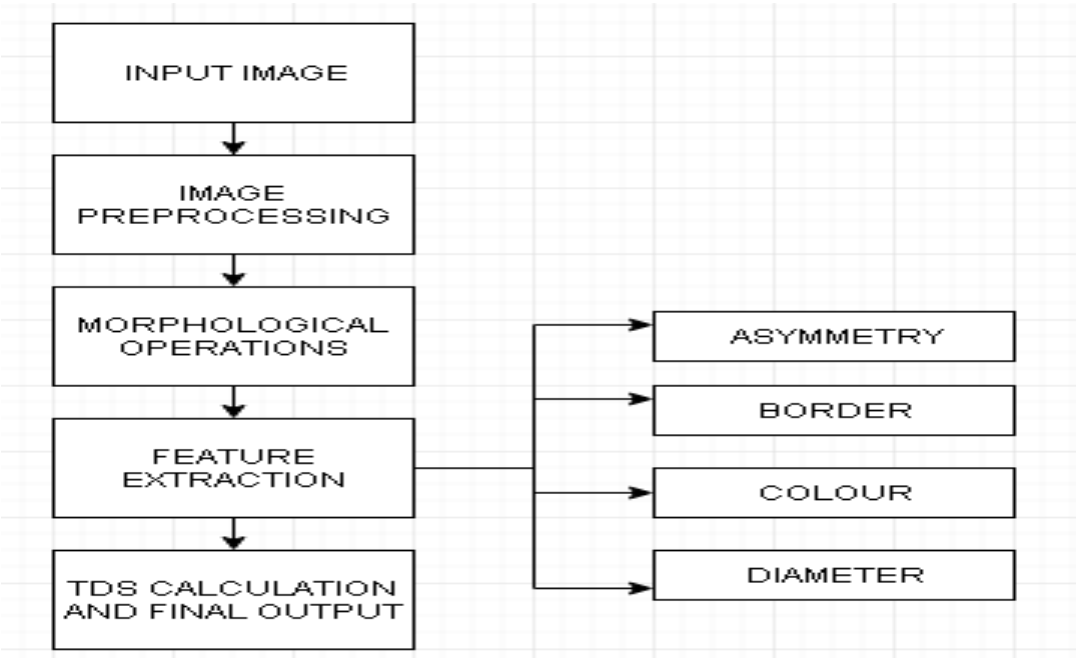


Fig.2. System Architecture of proposed method

Pre-processing:

The first and the foremost step in the regular and automated analysis is to pre-process the image. The pre-processing techniques differs with various dataset of the images with various applications. The pre-processing techniques is done to classify the images based on image enhancement and image restoration. Due to clatter in image, we have a tendency to conduct filtering technique referred to as Gaussian filter [9]. In this work, 5*5 Gaussian filter is used to smoothen the image, since second convolution is used in Gaussian to 'blur' the images and to get rid of hair and noise.

(i) **(ii)**

Fig. 3. (i) Input image; (ii) Filtered Image after Gaussian filtering

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B. Morphological Operations

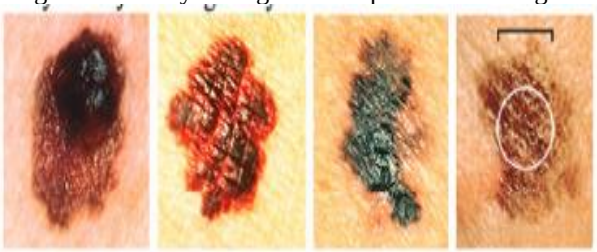
Morphological operations like dilation and erosion is applied to the image before the filter image is preceded. Figure 4 shows the image filtering the image that is morphological operations. Morphological operations are applied on binary image [10]. Dilation continued by erosion is the closing operation and opening operation is the reverse of closing operation. In a binary image, the object can be thickened by distension and shrinkened by using the method erosion. The structuring element is used to prevent thickening and thinning the image and the objects.

Fig. 4. Filtered image after Morphological operations

C. Feature Extraction:

It is very vital to detect lesion, the affected skin area at the earliest which is even very crucial step for the skin cancer treatment. It is desirable if this can be achieved while not acting any diffusion within the body as a style of immunization. Inspecting the digital images of the skin lesion which is done by feature extraction tool is the easiest way to analyze the cancer effectively. This feature extraction can be done on ABCD rule. The ABCD rule is abbreviated as Asymmetry, Border structure, Color variation and Dermoscopic structure of lesion which defines the way to diagnosis the disease.

- Asymmetry: Symmetry is extremely useful in pattern analysis which is done by bisecting the image in two 90 degree axis. Half of the pattern can be used to analyze with the case of symmetric pattern.
- Border Irregularity: Cancerous lesions are mostly ragger, notched or blurred.
- Color Variation: Color variation is the early sign of skin cancer. Since melanoma cells highly increases with its pigmentation, they are regularly bright relying upon development of melanin color at differing color in the skins. This pigmentation isn't homogeneous. Thus the six colors existences that must be detected are red, dark brown, white, black, light brown, slate blue and black.
- Dermoscopic structure: Melanoma tends to breed larger than ordinary moles, the diameter of 6 mm. Because of the lesion are often uneven forms, to find the diameter, draw from all the edge pixels to the pixel edges all the way through the midpoint and averaged.



a) Asymmetry b) Border c) Color d) Diameter

Fig 5: Feature Extraction for image segmentation

TDS calculation

TDS score is calculated using the following criteria:

(i) Asymmetry
(ii) Border
(iii) Colors and
(iv) Dermoscopic structure

The above said criteria is multiplied with the given weight factor to obtain a TDS total. If the TDS value is less than 4.75 then it indicates as a non-cancerous cell, values between 4.8 and 5.45 indicate a doubtful lesion, and values that are 5.45 or greater are highly suggestive of melanoma.

Criterion	**Description**	Score	Weight factor
Asymmetry	0, 1, or 2 axes;	0-2	X 1.3
Border	0-4 segments	0-4	X 0.1
Color	6 colors (white, red, light brown, dark brown, blue-gray, black)	1-6	X 0.5
Dermoscopic structure	Presence of network, structure less	1-5	X 0.5

Formula for calculating TDS:

[(A score x 1.3) + (B score x 0.1) + (C score x 0.5) + (D score x 0.5)]

IV. CONCLUSION

The proposed novel based method is used to classify the dermoscopic images which gives the correctness of result by classifying them either with their presence or absence of melanoma. Also this method can easily partition the mole and detect the cancer on skin automatically. In addition to this, some other derived features may be used in identifying skin lesion. This is a innovative idea that needs more examination and evaluation and has a good potential for potential research. Furthermore, we believe that the same scheme with different features can also be useful for extracting other skin patterns.

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