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Early Detection of Melanoma using Fuzzy Lesion Analysis System

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Abstract: A non-invasive diagnosis technique place an important role for early detection of melanoma malignant for dermoscopic image. Even for experienced dermatologist, diagnosis by human vision can be non-reproducible, inaccurate and subjective. The image characteristics include fuzzy lesion boundaries, varying lesion shapes and their sizes, presence of hair and color types of different skin. To assist in the interpretation of the image, the automatic classification of dermatoscopy images has proven to be a valuable aid in clinical decision making. However, existing methods have problems in representing and differentiating skin lesions due to the high degree of similarity between melanoma and non-melanoma images and large except from the images a variety of skin lesion. To overcome these limitations, this study proposes a new method for automatic multi-scale public of melanoma in dermoscopy images of the lesion is biased representation (1000) and vice versa general classification (JRC). For the diseases of the skin by means of the representation of the 1000 round, so that is set before us represent a number of scales, to use the traditional methods from a variety of Histograms of one of the scale is very near and the skin is able to represent the histogram of the lesion. 1000 or representation was used by the JRC melanoma detection. JRC The proposed model allows us to use additional data to derive a set of approximately Histograms of melanoma is going, where existing histogram like most trust in him. General Calendar method in public in our dataset of dermoscopy images, and demonstrates superior performance compared to the current state of the art method.

Keywords: JRC, Lesion Segmentation, MATLAB, Image Acquisition system.

I. INTRODUCTION

Melanoma is the most common type of skin cancer and its incidence has increased rapidly in recent decades. Nevertheless, it is also the most type of treatable skin cancer, if diagnosed at an early stage. The clinical diagnosis of melanoma is usually based on the ABCD rule, a four parameter analysis (asymmetry, border irregularity, color and dimension) or the 7-point checklist which is a scoring method for a set of different characteristics. According to the color, shape and texture. Melanoma, a type of skin cancer must be diagnosed at an early stage. Early diagnosis makes the treatment effective and the patient's life can be saved. Dermatoscopy has become an important technique in the early diagnosis of melanoma. In this technique, the oil is applied to the skin surface where the lesion is present and the polarized light is incident on the skin. Then the image is acquired with a digital camera attached to dermatoscope. This process reveals the morphological structures that are present in the deeper layer of the skin. When the acquisition of the image is performed using dermatoscope, some the artifacts are introduced into the image. The hair on the skin can be segmented into lesions because the dark pixels are classified as lesion vis-à-vis lighter pixels that will be classified into skin. It is therefore necessary to remove these hair pixels from the acquired image. In some cases, the dermatoscope is equipped with measurement marks to measure the diameter of the lesion. So these markings will be there in the acquired image. Air bubbles and the black frame in the image can affect the precision of the segmentation process and a more in- depth diagnosis of skin cancer. So these artifacts have to be removed from the dermoscopic image. In some cases, the contrast between the skin and the lesion may be very small. It is necessary to increase the contrast between the skin and injury. The histogram-based technique can be used to improve the contrast. Equalization of the histogram gives good results for dermoscopic images. This involves gray scale remapping to produce a uniform distribution input image. Improved contrast between the lesion and the skin improves the accuracy of other diagnostic steps.

II. EXISTING SYSTEM

In the existing system, the system has approached a real-time image analysis system to facilitate the prevention of malignant melanoma and early detection. The existing system had an image recognition technique, where the user would be able to capture skin images of different types of moles. The system will analyze and process the images and alert the user in real time for emergency medical assistance.

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Existing work has introduced practical steps to automate the melanoma prevention and detection process. Experimental results from a PH2 dermatoscopy research database confirm the effectiveness of our system. However, the novelty of our system lies in the fact that we have improved the efficiency of the system by putting in place an advanced image processing framework to detect suspicious areas. Prevention of skin cancer. The goal of the existing system was to demonstrate how smart phones can be turned into powerful, intelligent machines and help large populations without expertise in low-resource settings.

Disadvantages:

1. It is not considered a real-time system.
2. The details of the lesion will not be clearly visible.
3. Capturing images in different light environments will be anotherchallenge.
4. The size of the lesions captured varies with the distance betweenthe camera and the skin

III. PROPOSED SYSTEM

This new framework is able to classify dermoscopy images into benign, atypical and melanoma with great precision. The system calculates the burn time of the skin and the system sends a real- time alert to the user to avoid sunlight and seek shade to prevent the development of skin cancer. This is the first proposed model that calculates the skin time to be burned according to UV index, skin type, environmental parameters and SPF, unlike the one that only takes into account the UV index and of the skin type.

Image segmentation:-

Segmentation of pigmented skin lesions to separate the lesion from the background is an essential process before starting feature extraction to classify the three types of lesions. The disk structure element is created to preserve the circular nature of the lesion. The radius is specified as 11 pixels so that large spaces can be filled. Then, the disk structure element is used to performa morphological closure operation on the image.

Figure 1: Dermatoscope capturing image of skin

IV. SYSTEM ARCHITECTURE

Hair Detection and Exclusion:

This section introduces an image processing technique to detect and exclude hair from dermoscopy images as an essential step also seen. The result is a clean hair mask that can be used to segment and remove hair from the image, preparing them for further segmentation and analysis. To accomplish this task, a set of 84 directional filters are used. These filters are constructed by subtracting a directional Gaussian from an isotropic filter.

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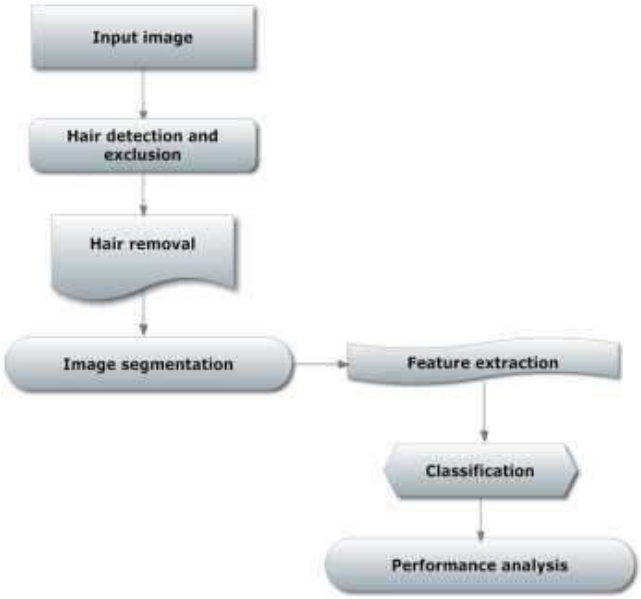
Feature extraction:-

In this study, five different sets of features are calculated. This is the 2D fast Fourier transform (4 parameters), the 2D discrete cosine transform (4 parameters), the complexity function set (3 parameters), the color function set (64 parameters) and the set of characteristics of the pigmentary network (5 parameters). In addition to the five sets of features, the following four characteristics are also calculated: the lesion shape function, the lesion orientation function, the lesion lesion function, and the lesion intensity model function.

Figure 2: System architecture

Figure 3: Flow Diagram



Classification:-

In this framework, three types of classifiers are proposed, namely a classifier of level (classifier A) and two classifiers (classifier B and C). The first step of this framework is to perform an image processing to detect and exclude the hair, after the return on investment of the skin lesion is segmented. Then, the characteristics of the image are extracted. Then, the extracted entities are passed to the classifiers.

Performance Analysis:-

The dermoscopic images were obtained under the same conditions using a magnification of 20x.This image database contains a total of 200 dermoscopic lesion images, including 80 benign, 80 atypical and 40 melanoma. These are 8-bit RGB color images with a resolution of 768 × 560 pixels. Because the database is anonymous and is used for training purposes, no IRB approval was required for this study.

V. RESULTS

In the proposed system, the Pedro Hispano Hospital PH2 Dermoscopic Image Database is used for system development and testing purposes. The dermoscopic images were obtained under the same conditions using a magnification of 20x. This image database contains a total of 200 dermoscopic lesion images, including 80 benign, 80 atypical and 40 melanoma. These are 8-bit RGB color images with a resolution of 768 * 560 pixels. Because the database is anonymous and is used for training purposes, no IRB approval was required for this study. The images in this database are similar to the images captured by the proposed system. We decided to use this database for implementation and test plan as it is verified and established by a group of dermatologists. The figure shows an example of images from the PH2 database and images captured by the proposed system. In the experiments, 75% of the images in the used for training and 25% are used for testing. In collaboration with the dermatology department of the hospital, we recovered six cases of suspected cases. We also used six normal cases. We are recovering more cases to improve

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and test the algorithm. However, the acquisition of cases requires effort and time, as medical personnel must be trained and the patient's consent must be given. Our algorithm was able to identify 5/6 normal cases as normaland 6/6 cases suspected as abnormal.

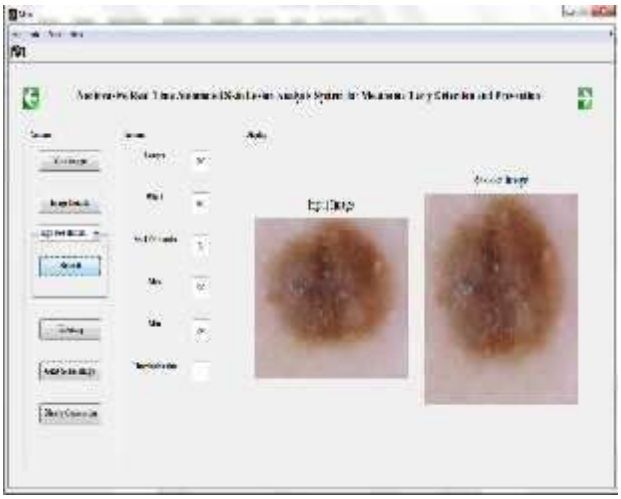

Figure 4: Giving input image and Hair removal process

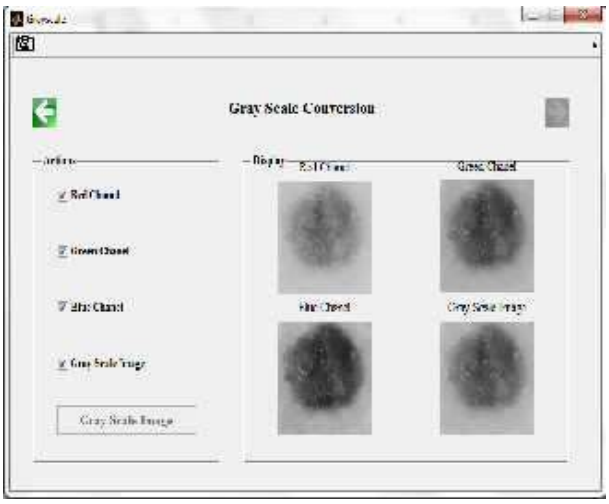

Figure 5: Gray scale conversion

Figure 6: Binary conversion and segmented output

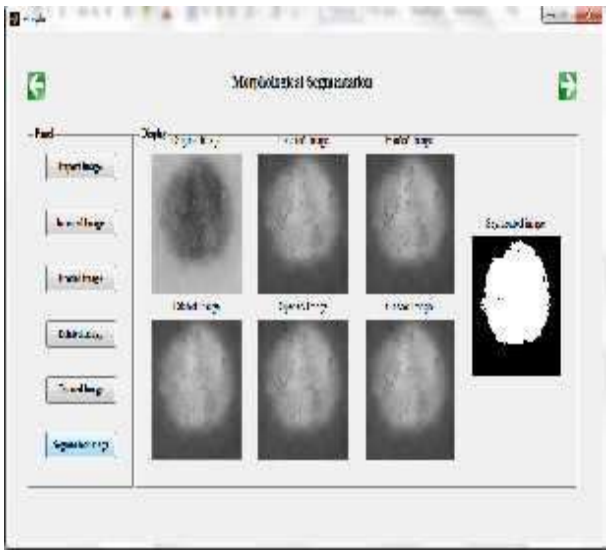

Figure 7: Detection of stages of melanoma

VI. CONCLUSION

In this project, the proposed system has two components. The first component is a real-time alert to help users prevent skin burns caused by sunlight. A new equation for calculating skin- burn time was introduced into this component. The second component is an automated image analysis module where the user will be able to capture skin mole images and this image processing module classifies under which category the moles fall into; benign, atypical or melanoma. An alert will be provided to the user to ask for medical help if the mole belongs to the atypical category or melanoma.

The proposed automated image analysis process included image acquisition, hair detection and exclusion, lesion segmentation, feature extraction, and classification. The proposed system used astate of the art for dermoscopy image acquisition, which ensures the capture of sharp dermoscopy images with a fixed distance to the skin and a consistent image quality. The image processing technique is introduced to detect and exclude hair from dermoscopy images, preparing them for subsequent segmentationand analysis, resulting in satisfactory classification results. The state of the art is used in the proposed system for dermoscopic image acquisition, which ensures the capture of sharp dermoscopy images with a fixed distance to the skin and constant image quality. The image processing technique is introduced to detect and exclude hair from dermoscopy images, preparing them for further segmentation and analysis, resulting in satisfactory classification results. This system offers an automated segmentation algorithm and newfeatures. He is able

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to classify dermoscopy images into benign, atypical and melanoma with great precision. This new framework is able to classify dermoscopy images into benign, atypical and melanoma with great precision. In particular, the framework compares the performance of three proposed classifiers and concludes that the two-level classifier outperformsthe one-level classifier.

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