IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 7, July 2016

A Real Time Image analysis System to Detect Skin Diseases

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Abstract: Skin diseases rate has been increasing for past few decades. One of the risk factor in skin diseases is unprotected exposer to UV radiation, which causes various skin diseases. For early diagnosis of skin cancer, psoriasis and dermatophytosis increases chance for cure significantly. Therefore proposed method used for a real time analysis system, which will detect skin diseases. The image recognition technique where user will able to capture skin images of different mole type or rashes type. System will analyze and process the images, which alert the use to seek medical help urgently. This system will introduce steps for automating the process of skin diseases prevention and detection.

Key words: Enhancement, statistical analysis, Adaboost classifier.

I. INTRODUCTION

A. Background and Motivation

Now a day's people of different age groups are suffering from skin diseases and lesions such as eczema, scalp ringworm, skin fungal, skin cancer of different intensity, diabetic ulcers, psoriasis symptoms etc. The above said diseases strike suddenly without warning and have been one among the major disease that has life risk.

If skin diseases are not treated at earlier stage, then it may lead to complications in the body including spreading of the infection from one individual to the other. The skin diseases can be prevented by investigating the infected region at an early stage. The characteristic of the skin images are diversified, so that it is challenging job to devise an efficient and robust algorithm for automatic detection of the skin disease and its severity. Skin tone and skin color plays an important role in skin disease detection. Colour and coarseness of skin are visually different. Automatic processing of such images for skin analysis requires quantitative discriminator to differentiate the diseases. In this paper we propose Image analysis system to diagnosis multiple skin disease using statistical parameter analysis. Statistical analysis is concerned with analysis of random data. Random data is nothing but random pattern of skin diseases. Though random data has not any mathematical expression still it has some statistical properties. To analyse random data we must analyse statistical properties of it. This type of analysis is done by statistical analysis.

B. Contribution

In this paper we propose Image analysis system to diagnosis multiple skin disease using statistical parameter analysis. Statistical analysis is concerned with analysis of random data. Random data is nothing but random pattern of skin diseases. Though random data has not any mathematical expression still it has some statistical properties. To analyse random data we must analyse statistical properties of it. This type of analysis is done by statistical analysis this system is combo-model which is to be used to diagnosis multiple skin diseases at a time. The target skin diseases are skin cancer, psoriasis and dermatophytosis. The disease diagnosis and classification is based on statistical parameter analysis. Statistical parameters includes: Entropy, Texture index, Standard deviation, Correlation fact Depending on standard range of parameters skin disease is going to be diagnosis as well as classified.

C. Paper Organization

Paper is organized as follows: Section II related work. Section III proposed system named image analysis system to detection of skin diseases. Section IV describes the technique for skin disease images classification. In Section V It shows the results of the classification framework. In Section VI It conclude the paper with future work.

II. RELEATED WORK

Skin image recognition has become one of the attractive and demanding research areas in the past few years. Colour histogram based features are used to analyse and classify the psoriasis infected skin images in order to take the diagnostic measures [3]. On one hand this would be useful for dermatologists to reduce diagnostic errors, while on the other hand it can serve as the initial test bed for patients in rural areas where there is a dearth of good medical professionals. A support Vector Machine with RBF kernel is used for the classification of images. The experimental results gave the encouraging results in an initial attempt for identification of psoriasis infected skin images. Classification of psoriasis skin diseases and their severity will be carried out.

Image processing method is implemented in MATLAB, for skin cancer detection. In this paper, online database of skin cancer images is used for testing the method [4]. Skin images for cancers of different types are obtained from, of these images for BCC (Basal cell carcinoma), SCC (squamous cell carcinoma) and normal or harmless skin

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lesions are collected and database is created for testing purpose Next step in image processing is de-noising using wavelet tool. To remove low frequency or background noise from image, filtering is used. After de-noising the image, median filtering is applied to remove some hair like material from skin image, if present Thresholding is the simplest and most commonly used method of segmentation. This paper considers use of high level feature extraction technique by implementing the 2D-DWT as the processing method neural network tool is used for classification of skin images in different skin diseases. Using the features extracted from image, it is classified either in harmful diseased i.e., BCC (Basel cell carcinoma), SCC (Squamous cell carcinoma), or harmless. Buket D. have worked on real time system for the malignant melanoma prevention and early detection [5]. In this system user is able to analyse captured image. System process the image and shows the notification for medical help. This system shows convincing results and accuracy. Ho Tak Lau. Have worked on an automatic skin cancer classification [6]. Available image is given to the system and it goes through different image processing procedure. Use full information is extracted from the image and then with the help of training and testing system classifies the image. Recognition accuracy of the neural network classifier is 90%

Fig I. Sample Images from Database (melanoma, psoriasis, dermo)

III. PROPOSED SYTEM

In this paper, we propose the Real time system to detect skin diseases. Our system capture image from standard database and put in to the system to inform the user for preventing the risks related to skin diseases. More briefly we present the Image analysis system to detect different skin diseases, where user will able to take images of different moles or skin patches. Our system will analyse and process the image and classifies the image to normal, melanoma, psoriasis or dermo case based extracting the image features.

This database includes images of multiple skin diseases. These images are taken from standard database. Preprocessing of an image includes resizing of an image. Basic condition for any image processing algorithm is that images must be of same size for processing purpose. Hence in order to process out any image with respective algorithm we resize the image. It's necessary to have quality images without any noise to get accurate result. Noisy image may lead your algorithm towards incorrect result. Hence it becomes necessary to de-noise the image. Image de noising is an important image processing task, both as a process itself, and as a component in other processes. There are many ways to de noise an image. The important for good image de noising model is that it will remove noise while preserving edges. Traditionally, linear models have been used. To de-noise the image we can use median filter. Median filter does the work of smoothening of image. The input signal which we get that is RGB image. But for our algorithm we require gray images. Hence using rgb to gray conversion in MATLAB we convert RGB images in to gray images.

Image Enhancement:

To get accurate result in biomedical image processing it is always necessary that biomedical image must be of very good quality. However, practically this is not easy. Due to different reasons obtain low or medium quality images. Hence it becomes necessary to improve their quality. To improve the quality of image using image enhancement algorithm. This algorithm enhances the image by focusing on parameters like contrast, brightness adjustment.

Statistical Analysis:

Statistical analysis of skin image is supposed to give different statistics such as: Entropy Standard deviation Texture factor correlation factor Depending on this parameter first find out there range for individual skin disease. To find out range of these parameters used for standard skin disease image database.

- First we calculate the variance with the help of sample mean

$$\sigma_I^2 = \frac{\sum_{i=l1}^{l2}(I_1(i) - m_i)^2}{l_2 - l_1}$$

- With the help of variance, we calculate the energy of the image I by taking mean square of variance.
- We then calculate the luminance of image with the help of RGB components of image I, we calculate the RGB components of image by taking mean of R,G and B components.

$$L = \sqrt{((0.3 * r^2) + (0.587 * g^2) + (0.114 * b^2))}$$

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- We calculate sample similarity measurement with the help of resized image I2, texture T2, window and luminance L.
- We calculate the standard deviation of image

$$\sigma_i = \sqrt{\sigma_i^2}$$

- We calculate the entropy of the image

entropy $= -\text{sum}(p.* \log^2(p))$.

With the help of this parameters we correlate the image and classifies as per respected catagries.

IV. IMAGE CLASSIFICATION

In proposed system, we use standard database for the development and testing of proposed system. A framework Proposed system is shown in fig. 3.In this framework we use neural network. At first stage this frame work performs image processing for denoise the image and enhancement the image for statistical analysis. It calculate the entropy, Standard deviation, texture factor to find the range of parameters used in image. We use two leval classifier to get better results. With the help of AdaBoost classifier it correlate the images with deciding the the range of correlation with the help of mean, standard deviation based on intensity classifier classifies biomedical images. The Adaboost classifier is simple to implement and it gives 97.2% classification accuracy.

Table I Comparison of Classifiers

Classifier name	Accuracy %
kNN	95
NB	95.8
SVM	95.5
AB	97.2
OMK	93.7

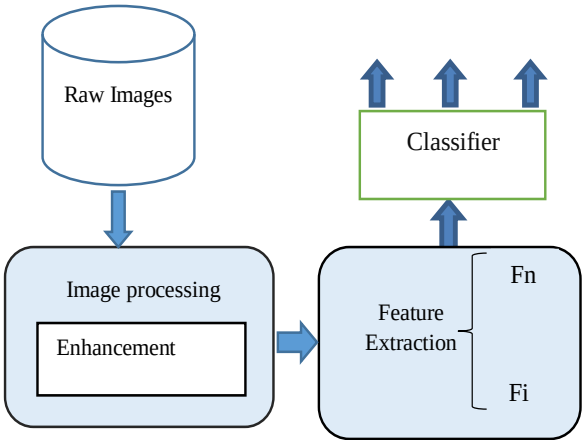

Fig II. Proposed Block Diagram

V. RESULTS

In the proposed framework as result of adaboost classifier, we can classify the normal, psoriasis, dermo and melanoma images with accuracy of 90% or more. Table II shows results for standard deviation. This automated image analysis module where Image processing module classifies under which category the image falls (Psoriasis, Melanoma and Dermatophytosis).

Table II. Results of statistical analysis.

	Luminance	Texture	Standard Deviation	Entropy
Psoriasis	200.1013-225.3665	0.1853-0.2404	9.5709-30.91	5.065-6.7293
Melanoma	192.0704, 100.2521	0.2764, 0.1645	60.6499, 21.1382	7.4575, 5.5998
Dermo	151.4497-196.3330	0.2011-0.2733	11.0351-54.5073	5.4555-7.5061
Normal skin	226.8690-244.7091	0.2235-0.2400	4.0219-19.6765	3.6991-5.6361

VI. CONCLUSION AND FUTURE WORK

In this paper we present Image analysis system for prevention and detection of skin diseases. Using statistical analysis with correlation algorithm we can diagnosis the multiple skin diseases as well as classify skin disease. Different statistical parameters has been studied amongst them are Entropy, Texture index, Correlation factor has been chosen to find out probability of disease. According to further requirement if necessary statistical parameters can be increased. Outcome of this system is supposed to diagnosis the multiple skin diseases as well as it classifies skin diseases. This future work may reduce the processing time of diffusion speed. That makes system faster.

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