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A Simple Model For Skin Disease Identification Using Image Processing.

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ABSTRACT

Human skin has various features such as uneven edges, texture and presence of melanin pigment imparts different colour to skin. Virus, bacteria, fungi causes various infection on skin that leads to variation in skin color and texture. The diagnosis of different skin diseases is very difficult in initial stage as all skin diseases look in the same way. The purpose of this work is to create a skin disease identification model by extracting the affected skin region from images andprocess using image processing techniques. The featuresof affected skin regions for Phynoderma,Acrochorton,Alopeciaareata and Lichen Amyloidosis were considered to create a model.

Keywords: Skin disease, Identification model, features, Images, Segmentation, Energy

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INTRODUCTION

Skin is the external surface of our body that covers the internal organs, protects from UV rays and other harmful elements. Human skin structure contains Melanin pigments,haemoglobin and the texture of the affected skin may slight vary from normal skin. Skin is affected primarily by Fungi, bacteria and viruses . streptococcus and staphylococcus aureus are the common bacteria , Herpes, simplex virus,poxvirus and human papillomavirus are the three main viruses that cause viral skin infection.Skin diseases diagnosis is a difficult task because the symptoms and initial appearance of affected skin are associated with all types of skin diseases[1].

Mathematical description for border of microscopic skin images can be used to differentiate between various lesions that are pigmented.Melanoma,Levi requires early detection hence image classification techniques on Epiluminiscence Light Microscopy images have speedup the disease diagnosis[2]. Melanoma detection using Dermoscopic images can be done with radial search methods and classify its types[3].CIElab values can be used to detect and identify various skin diseases in human[4].

Statistical features such as mean, standard deviation, Energy and contrast can be used extract the skin disease feature that could help in early diagnosis[5].Defect identification for fruits with image processing techniques can be used for tracking the available techniques[6]. Principal Component Analysis can be employed for identifying the major components in images[7-9].

MATERIALS AND METHODS

A description on the four diseases along with the sample images are presented below. HypovitaminosisA(also called phrynoderma)is related to nutritional deficiencies that affects children.The elbows and knees of the skin turn rough and lesion of the skin look like follicular, discrete and pigmented as shown in Fig.1.

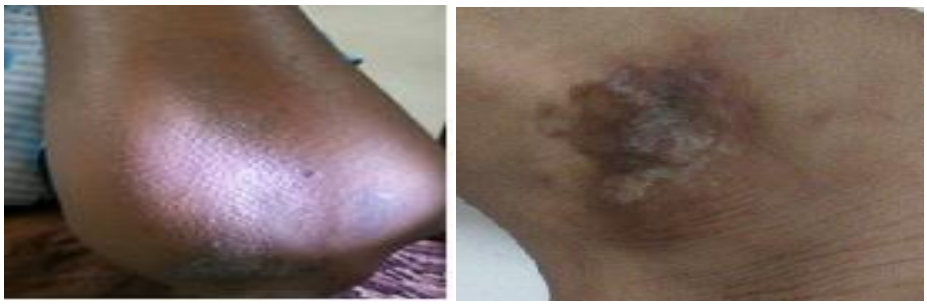

Fig 1: Phrynoderma affected sample skin images.

Acrochordon

45% of the population is affected by this disease and it is contagious in nature.The genetic component can have a another reason for this diseases.Mostly skin tag as shown in Fig 2 appear among women,theoverweight,diabetes and the older people.

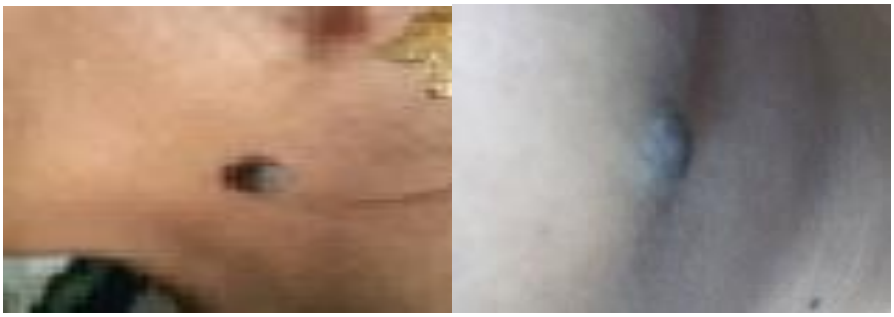

Fig 2:Sample image containing Acrochordon

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Alopecia areata

Alopecia areata is commonly asymmetric region of baldness on the eyebrows ,bearded portion and the scalp. The condition may occur when the cell of the white blood attack the hair follicles,it reduces the hair growth production dramatically.Genetics play a major causes of the diseases.It is a autoimmune disorder that appear unpredictable hair loss on the eyebrows,bearded portion and scalp. Initially hair fall begin in coin sized as shown in Fig 3aon the scalp and may affect the hair growth on the eyelashes and beard.

Lichen Amyloidosis

Amyloidosis is diseases when insoluble protein are deposited in an organs and tissues which effect the dysfunction of the particular organ.It creates chronic itchy surface of the skin in lower leg as in Fig.3b.

Fig 3a: Alopecia Areata

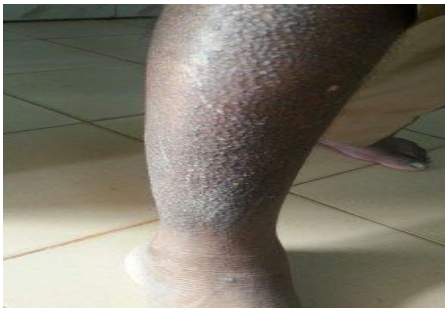

Fig 3b: Lichen Amyloidosis

EXPERIMENTAL WORK

The images (jpeg) of the above four diseases were used for pattern identification and characterization. Algorithm for characterization is given below.

Algorithm(skin_disease_characterization)

Step 1: Start
Step 2: Load the Image and Convert the image to Grayscale image.
Step 3: Use the Gradient Magnitude as the Segmentation Function
Step 4: Mark the Region of Interest using Principal Component Analysis.
Step 5: Calculate the features for the marked regions
Step 6:Display the results.
Step 7: stop.

The sample images were collected for the four disease and characteristics such as contrast,correlation,energyand homogeneity were identified.

RESULTS AND DISCUSSION

The above algorithm was implemented in Matlab and all collected skin disease images were run and all the results are tabulated as shown in table.1

Disease Name	Contrast	Correlation	Energy	Homogeneity
Alopecia Areata	1.36 to 7.04	1.63 to 1.68	8.26 to 9.97	7.47 to 8.08
Large Acrocordon	4.23 to 5.17	1.52 to 1.53	8.77e-02 to 1.00 e-02	8.32e-01 to 1.00e-01
Phynoderma	6.58 to 8.45	1.60 to 1.61	8.37e-02 to9.22e-02	8.03e-01 to 8.29e-01
Lichen Amyloid	2.41 to 3.35	2.09 to 2.10	1.16 e-01 to 1.16e-01	8.84e-01 to 8.81e-01

Table 1: Statistical features of skin disease images.

Contrast is the apparent feature that shows the intensity difference between pixels and the neighbours in the images,correlation identifies the relationship measure of pixels with its neighbours diseased images,energy shows the distribution of pixels in the image, homogeneity measures the closeness of the elements.

CONCLUSION

The results reveal that contrast for alopecia and phynoderma cannot be used as feature for pattern identification, similarly is homogeneity.Correlation and Energy parameters for the above diseases are distinct from each other and show a greater deviation, hence the parameters correlation and energy can be combined to identify the pattern or for characterization of diseases.

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