SKIN DISEASE DETECTION AND CLASSIFICATION USING IMAGE PROCESSING TECHNIQUES

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***Abstract**: As per the survey done in various developing nations, skin diseases have been the most ignored illness. Due to this ignorance towards the skin abnormalities it has taken a toll on life proving to be harmful and dangerous. So to improve the situation and spread the awareness, availability of the derma specialists in the remote and rural areas is essential but also practically impossible at times. In order to resolve this problem, it became necessary to come up with an algorithm which can be used as an initial testing and diagnosis tool. This paper suggests an accurate classification of data images which can be pre-processed and fed to the neural network using ANN classifier after calculating the colour code, energy, colour moment which would help as guiding tool.*

I. INTRODUCTION

Skin is the biggest organ of the human body. The rate of skin diseases has been seen to ascend in the recent years. A variety of them can be found and be classified into two groups of harmful and harmless. With the help of modern aids and technology, it is easy to treat the harmless one but takes rigorous efforts from the expertise of the other kind. For example, Malignant melanoma has 1000 deaths recorded by the USA[10].

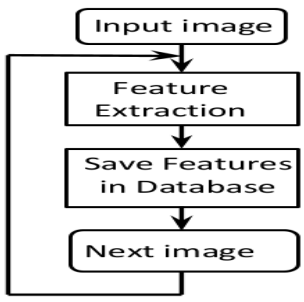
Skin diseases, if not controlled at an early age, can be very harmful, and can also result in one losing his life. Perception of how a person looks, has a crucial role in his self-confidence. In the world of internet, people assume that they will always find a relevant solution of any question online, and hence, they believe that the methods or hacks that they find on the internet should help them get rid of their disease which is not true in most cases. Skin diseases can be easily contagious and can be transferred to people by even a touch. Hence controlling the disease in its initial stage is necessary [2]. This paper guides you through an implementation of diagnoses system, which helps the user to detect and analyze a skin disease. To obtain the data from this mobile application, the user will be asked to upload a photo of the seemingly infected part of that skin to the application and answer some of the questions that are asked. The question asked will be to understand the symptoms of the disease. Based on the image provided by the user and his/her answers to the questions asked, the application will identify the disease for the user and suggest some medication and medical treatments.

Image processing and data mining play a major role in detecting skin diseases. The project has been divided into the steps mentioned below:

- Image pre-processing, segmentation and extraction of features.
- Classification model and skin disease predication.
- Medical treatment suggestions or advice if any.

II. PROPOSED WORK

A. Creation of database:



Flowchart for Create database

Fig 2.1: Creation of database

In the processing of an image, feature extraction starts from a data at the initial stage and keeps on building its derivative values, which portrays information and non-redundant values. Also helps for better human interpretation of data. Feature extraction can be generically termed as dimensionality reduction[11]. Feature extraction involves a data which is extracted and formed into a new subset. This process is defined as feature extraction.

B. Feature selection:

Use of subset and its relevant features for the construction model is known as feature selection. An image contains huge amount of redundant data. So to reduce the redundancy of the data, shorten the training time, simplification of the model, enhancing of generalization or reduction of variance, feature selection is used in training purpose of image processing.

C. Feature extraction for an image:

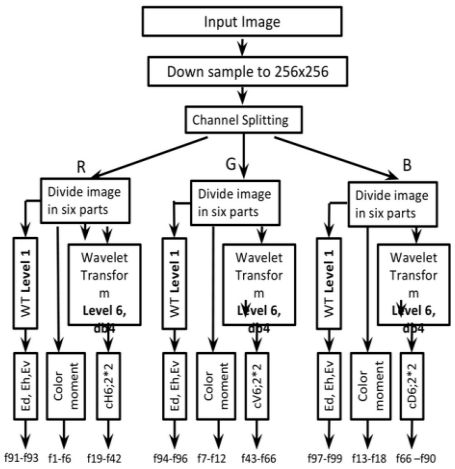


Fig 2.2: Feature extraction model

When the user puts up an diseased skin image for the process of its classification, every image goes through all the blocks specified in the above block diagram. An image can be divided into a matrix and downsampled to a particular desired size. The image is then split up according to the color components i.e. R, G, B. A wavelet transform of level 1 and level size is applied. With these results calculation of the energy vertically, diagonally and horizontally is done.

Color moment: This is used for retrieval of the image applications and to compare the desired two images. Once the comparison of the images is done it gives a value as the output, lower the value similar the images being compared.

D. ANN(Artificial Neural Network)

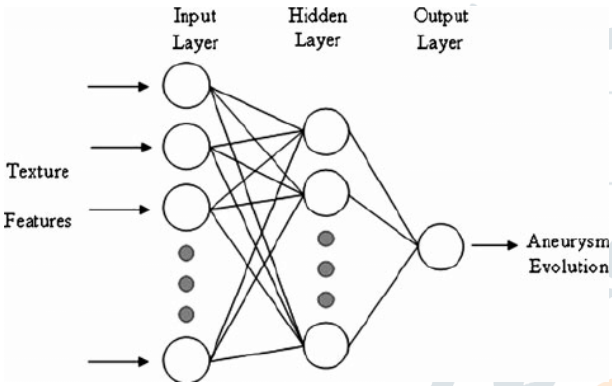


Fig 2.3: ANN Classifier

This classifier can be used as an approximation tool in case of features comparison as it learns by observing. It is a fairly simple mathematical model and has three layers. The first layer sends the input of the features extracted from the image. The second layer is where the comparison of the disease input image and the database stored image will be done and the result will be passed on by the neuron to the output layer[11-14]

E. Disease classification model:

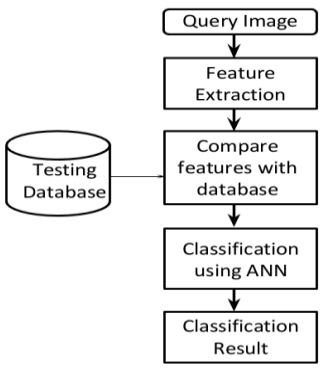


Fig 2.4: Flowchart of classification of disease

For the classification purpose here the user has to input a query of the diseased skin image to which the feature extraction process will be applied. The feature that is extracted from the input user image is then compared to the image features stored in the database. By applying the ANN classifier, which proves to be most suited, the operator can get the accurate classified result in the form of disease detected.

III. RESULTS AND ANALYSIS

The proposed work successfully detects the diseases like ringworm, vitiligo, scabies, melanoma, psoriasis. The main GUI is as shown below:

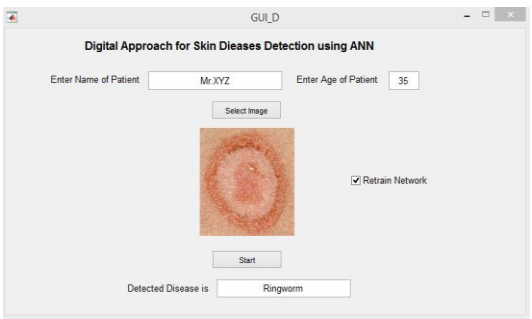


Fig 3.1: GUI showing the main page for the user

The figure shows the main page which the user would see while using. The user has to enter the name of the patient, age, and image as input parameters. After the process is begun, within less than a minute the result is displayed in the detected disease section.

IV. PERFORMANCE EVALUATION

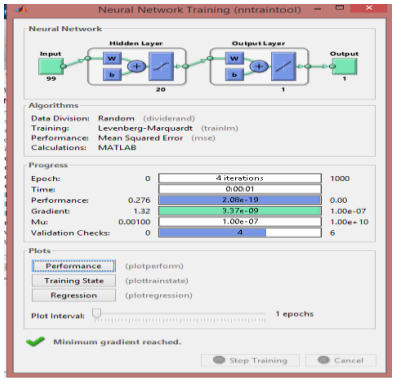


Fig 4.1: Neural Network Training Tool

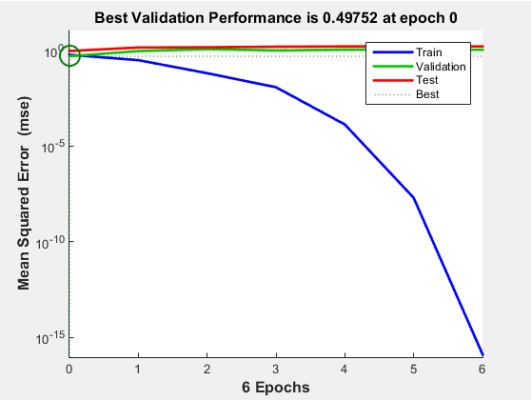


Fig 4.2: Validation performance graph

In this process, the disease is accurately classified into vitiligo, ringworm, psoriasis, ringworm and takes up to 5 seconds for the entire process. The best validation performance can be seen as 0.49752 at epoch 0. Such 6 epoch are considered for the overall validation performance of the system.

V. CONCLUSION

This system proposed can be used to provide an inexpensive and efficient way to recognize and diagnose skin diseases. On one hand, this would be useful for the dermatologists to reduce diagnostics errors, while on another hand it can serve as the initial tool for patients in rural areas where there is lack of skilled medical professionals. Within 6 iterations of training and retraining network and 86% accuracy, the system can successfully serve the rightful results for the skin diseases like vitiligo, ringworm, scabies etc. It can be modified to an extent where a number of diseases can be accurately diagnosed.

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