Skin Disease Detection System

PROJECT SYNOPSIS
OF MINOR PROJECT

BACHELOR OF TECHNOLOGY
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1 INTRODUCTION:

Skin diseases are more common than other diseases. Skin diseases may be caused by fungal infection, bacteria, allergy, or viruses, etc. A skin disease may change texture or color of the skin. In general, skin diseases are chronic, infectious and sometimes may develop into skin cancer. Therefore, skin diseases must be diagnosed early to reduce their development and spread. The diagnosis and treatment of a skin disease takes longer time and causes financial and physical cost to the patient.

In general, most of the common people do not know the type and stage of a skin disease. Some of the skin diseases show symptoms several months later, causing the disease to develop and grow further. This is due to the lack of medical knowledge in the public. Sometimes, a dermatologist (skin specialist doctor) may also find it difficult to diagnose the skin disease and may require expensive laboratory tests to correctly identify the type and stage of the skin disease. The advancement of lasers and photonics based medical technology has made it possible to diagnose the skin diseases much more quickly and accurately. But the cost of such diagnosis is still limited and very expensive. Therefore, we propose an image processing-based approach to diagnose the skin diseases. This method takes the digital image of disease effect skin area then use image analysis to identify the type of disease and python are also be used in it. Our proposed approach is simple, fast and does not require expensive equipment's other than a camera and a computer.

1.1Technology used

Programming Language:

- Python

Python is a general-purpose high level programming language that is widely used in data science and for producing deep learning algorithms. It contains libraries like libraries like Numpy, Scipy, Pandas, Matplotlib; frameworks like Theano, TensorFlow, Keras.

Image Processing:

The extraction of features plays a key role in helping to classify skin diseases. In this research the method of detection was designed by using pretrained convolutional neural network and SVM.

2. RATIONALE

Basically, machine learning has also been gradually applied to Skin Diseases Detection System. However, in the field of skin recognition, the degree of complexity is high, the situation is complex, and the accuracy and speed of recognition are worrying. This project makes an attempt at creating a model which can be used in future for multi-class image classification. The aim is to end up as a well-designed solution for classifying the skin image dataset.

3 Objectives

- To develop an effective and efficient model which detects and predicts skin disease based on the user input
- To achieve good accuracy.
- To develop a User Interface (UI) that is user-friendly and takes input from the user and predicts the skin disease.

4.Literature Review

Several researchers have proposed image processing-based techniques to detect the type of skin diseases. Here we briefly review some of the techniques as reported in the literature.

In [1], a system is proposed for the dissection of skin diseases using color images without the need for doctor intervention. The system consists of two stages, the first the detection of the infected skin by uses color image processing techniques, k-means clustering and color gradient techniques to identify the diseased skin and the second the classification of the disease type using artificial neural networks. The system was tested on six types of skin diseases with average accuracy of first stage 95.99% and the second stage 94.016%.

In the method of [2], extraction of image features is the first step in detection of skin diseases. In this method, the greater number of features extracted from the image, better the accuracy of system.

The author of [2] applied the method to nine types of skin diseases with accuracy up to 90%.

Melanoma is type of skin cancer that can cause death, if not diagnose and treat in the early stages. The author of [3], focused on the study of various segmentation techniques that could

be applied to detect melanoma using image processing. Segmentation process is described that falls on the infected spot boundaries to extract more features.

The work of [4] proposed the development of a Melanoma diagnosis tool for dark skin using specialized algorithm databases including images from a variety of Melanoma resources. Similarly, [5] discussed classification of skin diseases such as Melanoma, Basal cell carcinoma (BCC), Nevus and Seborrheic keratosis (SK) by using the technique support vector machine (SVM). It yields the best accuracy from a range of other techniques.

On the other hand, the spread of chronic skin diseases in different regions may lead to severe consequences. Therefore, [6] proposed a computer system that automatically detects eczema and determines its severity. The system consists of three stages, the first effective segmentation by detecting the skin, the second extract a set of features, namely color, texture, borders and third determine the severity of eczema using Support Vector Machine (SVM).

In [7], a new approach is proposed to detect skin diseases, which combines computer vision with machine learning. The role of computer vision is to extract the features from the image while the machine learning is used to detect skin diseases. The system was tested on six types of skin diseases with accurately 95%.

5 FEASIBILITY STUDY

Framework venture practicality can be evaluated in three headways:

- Economically
- Technically
- Operationally

5.1 Economic feasibility

The expense of Software and Hardware needed for the framework including the capacity of information has been assessed. It can be developed using freely available open-source software (like Jupyter) on any basic modern personal computer. Once the project is developed, it does not need any additional cost for its application.

5.2 Technical feasibility

This project is technically feasible as it will employ Supervised learning for classification and labeling. we can expect it to be able to identify the type of skin disease based on the photograph supplied. There have been few projects and studies in this field that we're able to achieve up to 75% accuracy.

5.3 Operational feasibility

Operational achievability is reliant on the clients who will utilize the product once it's prepared for use. The product will have an easy to understand interface which will be exceptionally advantageous as they will simply need to open the online application, upload a clear image of the affected area and give the symptoms in the format of a web form and they will get the result and suggestions(if any). Thus, the project is operationally feasible.

6.METHODOLOGY

In this section, the methodology of the proposed system for detection, extraction and classification of skin diseases images is described. The system will help significantly in the detection of melanoma, Eczema and Psoriasis. The whole architecture can be divided into several modules comprising of preprocessing, feature extraction, and classification.

6.1 Image Resizing:

To resolve the problem of different image sizes in the database an input image is either increase or decrease in size. Unifying the image size will get the same number of features from all images. Moreover, resizing the image reduces processing time and thus increases system performance.

6.2 Feature Extraction:

At the beginning, Convolutional Neural Network (CNN) is a set of stacked layers involving both nonlinear and linear processes. These layers are learned in a joint manner. The main building blocks of any CNN model are: convolutional layer, pooling layer, nonlinear Rectified Linear Units (ReLU) layer connected to a regular multilayer neural network called fully connected layer, and a loss layer at the backend.

6.3 Classification:

Classification is a computer vision method. After extracting features, the role of Classification is to classy the image via Support Vector Machine (SVM)

7. FACILITIES REQUIRED FOR PROPOSED WORK

7.1 Software Requirement

- Visual Studio Code
- Matlab

8. Expected Outcome

- Visualisation of processed form of data with python libraries.
- Trained model on the basis of target features of dataset values.
- Evaluation of results for testing dataset with interpretation and visualisation.

9. Reference

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