

An overall medical recommendation for the precise recognition and detection of skin diseases through CNN

¹Naresh Bathuka, ²Dr. Sk Altaf Hussain Basha, ³Kavitha Konka, ⁴Thanniru Shivani

²Professor, ^{1,3}Assistant Professor, ⁴Student, ^{1,2,3,4}Department of Computer Science Engineering, Siddhartha Institute of Engineering and Technology, Hyderabad, India.

ABSTRACT

One of the many common diseases in the world is skin disease. Due to issues with the texture, presence, and colour of their skin, diagnosis is quite challenging. It is necessary to develop methods like machine learning to increase the diagnostic precision of different kinds of skin diseases. The application of machine learning techniques in the medical industry is common for diagnosis. These algorithms make decisions based on the input values of image feature values. The feature extraction stage, the training step, and the testing step make up this procedure. Machine learning methods are used in this procedure to train on various skin picture examples. This technique aims to increase the precision of skin disease detection. There are three crucial factors for categorising images are texture, color, shape and combinations thereof. This work uses color and texture characteristics to classify skin disorders. The input image is a microscopic or histopathological image, from which features such as color, shape and texture are extracted and passed to a convolutional neural network (CNN) for classification and identification of the disease. The goal of this project is to accurately and easily detect types of skin diseases and recommend the best overall medical recommendations.

Keywords: Image Analysis, Machine Learning, Convolutional Neural Network

INTRODUCTION

Due to widespread ignorance and low knowledge, dermatosis is one of the most prevalent and challenging disorders to diagnose. For the purpose of preventing skin conditions, some people in many developing nations visit a dermatologist. The initial stages are crucial. The skin of the buttocks is crucial for defending the body from dangerous bacterial and fungal diseases. Many people have skin conditions as a result of genetics, employment, a bad diet, and chemical exposure. Climate, summer, and winter are only a few examples of environmental elements that affect the development of skin diseases. As a result, it's crucial to recognize and diagnose skin conditions early on.

There are many types and forms of skin disease and they have many causes, including internal causes related to hormones and glands in the body such as acne, or external causes related to air pollution. and sun sensitivities such as rashes. Skin diseases, such as scabies and lice, may or may not be contagious. It can be contagious, such as drug allergies or rosacea, or chronic, such as psoriasis or atopic eczema, or, less commonly, sugar syndrome or Offji's disease. Societal Perspectives In general, it is desirable to reduce the severity and avoid visits to dermatology when a skin disease presents. Skin diseases account for 1.79% of human disabilities in all countries. According to world statistics [1]. Skin disorders cause approximately 30-70% of skin disorders. People from different countries of the world [2].

Skin cancer is an overgrowth of skin cells that sometimes occurs as a result of certain skin conditions. Wounds often untreated at first or caused by the sun's ultraviolet rays. Cancer is the second leading cause of death in men in recent years. Around 9 million people die each year, and 70% of these deaths are recorded in countries with low living incomes. This is due to the delay in the examination of specialists in the early stages of the disease, the difficulty of treatment due to the progression of the disease and the transformation into a kind of cancer, which reaches an advanced stage, leading to death [3-5].

Identification of skin diseases from microscopic images is provided to the image processing model. In the image processing, pre-processing, feature extraction are performed. Image processing models extract and analyze color, texture, and feature shares. It is then processed in a classification model. This classification model predicts skin diseased types.

Related Works

In this paper, the authors proposed a model for detecting skin lesions in input skin images using medical images. They used the methodology to create a prototype skin disease detection system. The objective of this project is to identify skin lesions from the texture analysis of input skin images, based on thresholds and neural networks for the detection and diagnosis of skin diseases.

In this research paper, process input images obtained from users and predict the presence or absence of skin diseases from new input images. The user input image is obtained using the android application. In this system, the app asks the user many questions and uses the end user's answers to predict the type of disease. Skin diseases such as eczema, fungal infections and urticaria are analyzed in this project. This question-and-answer based app does not deliver promising results every time.

This research paper predicts different types of skin disorders that users can take photographic images of the skin and provide a system capable of addressing and providing the presence or absence of various skin disorders. This proposed system used matlab tools to identify different types of skin disease cases, such as normal, melanoma, psoriasis, or skin cases, based on the extracted image features. The system alerts nearby medical teams if an anomaly is detected. This methodology suffers from segmentation issues, resulting in model-free accuracy for classification [7].

This article briefly discusses the importance of skin diseases as they are the most common at present, as skin allergies continue to increase due to environmental changes. The input image is obtained from the dataset.

Methodology

The proposed methodology is an effective tool which can analyze skin diseases entered by people to predict skin diseases. This proposed system uses a hybrid architecture using image processing and machine learning techniques to predict disease types with promising accuracy in a short period of time. The image processing phase uses preprocessing, segmentation and feature extraction steps. The machine learning phase consists of three steps: processing, training and detection. The proposed system uses a 2D wavelet transform algorithm for feature extraction in which color, texture and shape features are extracted from the input skin image. Correlation values are also extracted from the input image. These values are passed to the classifier model. For classification, the proposed system uses a convolutional neural network (CNN). Classifier models detect common skin diseases such as psoriasis, lichen planus and pityriasis

This proposed system can analyze various types of skin diseases, which saves the user time and money. This system uses python scripts based on Pycharm for experimental results. The main objective of this paper is to design a program using the python to detect human skin diseases [8] at an early stage. The outcomes are stated below:

1. To be able to classify the images based on the type of disease by SVM Classifier.
 2. To come up with a training model that can be used for testing.
 3. To create a Graphical User Interface (GUI) for making it easy to understand.
- The dataset images are collected from publicly available databases like Dermnet, DermWeb, etc. In the First Step, the sample images of five skin diseases need to be pre-processed using the SVM [9] and tensor flow. Secondly, the SVM is needs to train with the tensor flow and made corresponding geometric transformation pixels. Based on this, five types of skin diseases features are extracted, and their correlated parameters of pixels of skin areas are collected from image segmentation

which is done by pillow and numpy. Finally, a random image is run for testing which will show up that what kind of disease it is whether it is Melanoma or Psoriasis or Rosacea or Vitiligo or Xanthelasma by utilizing the support vector machine (SVM) [10] for the classification of the diseases and the name of the disease is shown as the output.

The Methodology used has two sections:

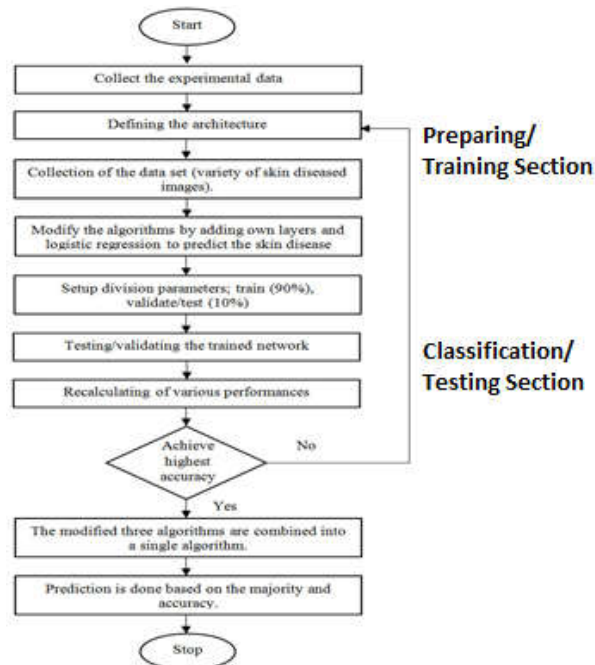


Fig 1. Flowchart for the Methodology used

- a) Preparing / Training Section
- b) Classification / Testing Section

a) Preparing / Training Section

Start: Initially the required software and the supporting modules should be installed in the computer as the dependencies to create, train and test the program.

Upload Dataset With Labels: The Data set which are collected from the various well known websites or from the doctors are to be loaded in to the program with the help of tensor flow minimum of hundred images can help in the better training and able to give good accuracy and the classes needed for image identification is the labeling which can give the output as the required name for the dataset. So the database of the images should be uploaded with labels for classification at the testing part.

Image Pre-processing: The image pre-processing is a technique that firstly the images collected will be resized using the modules pillow and the Numpy and converted them in to array of the images as the matrices. Then the image is processed with the pixels and saved the nearest matching with the pre-processed images can give the reliable output for the excellent outcome.

Feature Extraction Using SVM: The features which mainly extracted from the image are the pixels and vectors in it. The normal or database images are loaded in to the program then the features will get classified when the training process gets started.

Train The SVM Using The Tensor Flow Framework: In this project tensor flow is a main framework which is used to build the model based on the pixels of the image and need not extract any features from the image and the tensor flow has a greater accuracy of training and testing of about 91% accuracy so it is used for training the

images as SVM is the algorithm which is presented inbuilt with the tensor flow which is used for the classification purpose of the image. The SVM (Support Vector Machine) will classify the images based on the vectors of the images by drawing a linear line in the image and the pixels of the images which has higher amount is used to classify the image.

Save The Trained Model: The model which has a collection of images with its features has to save for the further proceedings to classify the images. The Model trained has been extracted as .h5 keras file which contains the trained dataset as the numerical values and arrays in to it which helps the SVM for classifying the differences between them.

b) Classification / Testing Section

Load The Trained Model In To The Program: The model which has been saved before will be using here to match with the testing dataset for the classification of the skin disease using the SVM Algorithm. The testing will be done in the further steps.

Run The Program: After the further procedures the testing program has to be run with all the required dependencies. The required dependencies are tensorlow, keras, pillow, numpy , tkinter trained .h5 keras model these are all the required dependencies to run the program for the further classification of the skin disesase all are set then the run the program.

GUI Opens Then Select The Image For Testing: The GUI (Graphical User Interface) it is box opens with the tkinter and pillow dependencies they opens the popup window for selecting the images. Then the testing image for the classification of skin disease needs to be uploaded.

SVM Compares The Testing Image With The Trained Model: The Testing image will match as it is machine learning the hidden work will be taking place within the period of 10-15 seconds the testing image which will match with the trained disease model will be given as the output

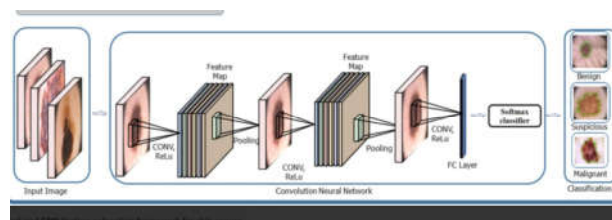


Fig 2 . Flow of Classification of the Image

Name Of The Disease Is Shown As A Result: After all the process the upload image will be processed and the name of the classified skin disease will be shown as the output. Whether it is Psoriasis or Rosacea or Melanoma or Vitiligo or Xanthelasma.

Exit: After the identification the exit has been given then press enter to exit to avoid the confusion between the results of the image.

Steps followed in SVM Training and Classification

1. Load The Data

First load the required dataset which you are going to use

2. Explore The Data

After loading the dataset you can have a check of feature and target names.

3. Split The Data

To understand the performance of model, the dataset should be divided into a training set and a test set is a good strategy for classification.

4. Generate The Model

Then build support vector machine model. First, import the tensorflow module and create support vector classifier object with the help of and save the model .h5keras. Then, fit your model on train set and perform prediction on the test set.

5. Evaluate The Model

Then finally estimate the accuracy by the classifier or model can predict effectively.

Fig 1 Flowchart for the Methodology used

Conclusion

Skin conditions have a significant impact on people's life and health. The current effort suggests a practical method for classifying five different skin diseases. To improve the accuracy of the diagnosis of several species of dermatological illnesses, it is necessary to abandon conventional techniques and create automated techniques. Melanoma, psoriasis, rosacea, vitiligo, and xanthelasma were the five different forms of skin diseases identified in this investigation. The programmed is created using the PYTHON programming language and machine learning techniques to recognize and detect dermatological pixels on the skin. Due to the identical impacts and symptoms that the patient experiences, this initiative will benefit a sizable portion of society and resolve the issue of the difficulty in identifying the different types of skin illnesses that humans are exposed to. It will also undoubtedly make a positive contribution to the discovery of skin diseases early and faster.

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