IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 2, March 2023
Impact Factor: 7.301

Skin Disease Identification using Image Processing

Prof. Vrushali Paithankar
Assistant Professor
Department of Computer Engg.
SKNCOE, Pune, India

Isha Uprit
Student
Department of Computer Engg.
SKNCOE, Pune, India

Adita Bairagi
Student
Department of Computer Engg.
SKNCOE, Pune, India

Himanshu Zoting
Student
Department of Computer Engg.
SKNCOE, Pune, India

Akshat Katarnavare
Student
Department of Computer Engg.
SKNCOE, Pune, India

Abstract: *Skin diseases are very dangerous and contagious. Dermatosis is the most common among other conditions caused by things like fungal infections, bacteria, allergies, or viruses. May cause. Dermatosis is diseases that affect the skin. Skin diseases are diseases that only a dermatologist can cure, while some skin diseases cannot be cured by proper medications. Skin diseases can also cause rashes, inflammation, itching, or other skin changes. The objective of this research is to detect skin diseases through image processing. In this process, we take an image of the infected part of the image and after analyzing the image using image processing techniques, we get an output of what type of disease it is and we use CNN for real-time detection of skin diseases.*

Keywords: CNN, Image Processing, Deep learning, Machine learning

I. INTRODUCTION

Dermatosis any disease or condition affecting human skin. Most diseases that affect the skin come from the layers of th e skin. Skin disorders that change the texture or color of your skin. Skin diseases can be caused by fungal infections, ba cteria, viruses, etc. Therefore, early diagnosis of skin diseases is essential to reduce their development and spread.
The skin disease treatment cycle is very long, most of the time people are unaware of it, it increases later, it is difficult t o cure and in some cases it even leads to death.
In this system we provide a system to detect and identify what type of skin disease it is. In this system, skin detection is done in 3 layers or 3 steps, these 3 steps are as follows:

1. **Image Acquisition:** Here we feed the input of CNN as images, by pre-treating if necessary.
2. **Image Augmentation:** The next step is data augmentation, which leads to data training, creation of data mode ls, etc.
3. **Classification/Output** The last step is image classification and extraction and finally classifies the affected are a according to the type of skin disease our proposed algorithm is fast, simple and does not require any equipme nt expensive, except for cameras and computers.

In this article, we use convolutional neural networks to predict skin diseases.

II. LITERATURE REVIEW

Some of the techniques that have emerged from the study of dermatological testing literature are as follows:-
1. Image Processing: Dermatological testing relies on image processing techniques that can control the early detection of skin diseases and controlling their spread. Image processing involves a detection system designed to enable the detection and identification of skin diseases. In this case, the user must provide an image of the infected area, then the input is area pre-processed and filtered to remove noise and segmented to extract lesions, and finally image features are extracted and classified to classify trajectories of the infected area.
2. Machine learning: Dermatology detection uses machine learning to learn data, evaluate and predict provided data, and give accurate results in a very short time, thus promoting and supporting the development of dermatology. Existing techniques for the detection of skin diseases are ANN (Artificial Neural Network), BPN (Backpropagation Network), SVM (Support Vector Machine).

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3. Convolutional Neural Network: Detection of skin diseases at the Using a Convolutional Neural Network An Image Classifier Using Software Diagnosis Disease. If no disease is detected, the system will return a negative result. So all detection is based on a convolutional neural network.

4. Deep Learning: Skin disease detection relies on deep learning for early detection of skin diseases such as skin cancer. Deep learning techniques are considered the most complex subfield of machine learning, involving artificial neural network algorithms. These algorithms are inspired by the structure of the brain. deep learning techniques are also applied in many other fields.

5. Computer Vision: Here skin disease recognition is done by image processing and machine learning techniques. User provides the image of the infected area as input, as and when as the next step image preprocessing technique is performed and extracts the feature values from the image, then classifies what type of disease it is. It is very beneficial for areas that do not have dermatological facilities.

III. SYSTEM ARCHITECTURE

The system architecture can be broadly divided into main phases.

1. Image acquisition
2. Image pre-processing
3. Data storage component to maintain test and training data images
4. Classifier to identify types of skin diseases

3.1 Image Acquisition

It takes time to understand how images are captured and stored in memory. To process an image and before analysing it, it is essential to capture the image. This is called image acquisition. Images are acquired with a suitable camera.

Basic image processing steps

- Image acquisition; - Image acquisition is the first step in image processing.
- Image recovery.
- Colour image processing.
- Wavelet and multiresolution processing.
- Compression.
- Morphological treatment.
- Segmentation.

3.2 Image pre-processing

Image pre-processing is the step of formatting images before they are used for model training and inference. This includes, but is not limited to, resizing, orientation, and color correction. Preprocessing refers to all the transformations performed on raw data before feeding it to machine learning or deep learning algorithms. For example, train a convolutional neural network on raw images.

3.3 Data Storage

Component to hold images of test and training data Training data is the initial set of data you use to train your machine learning application to recognize patterns or perform according to your criteria, while test or validation data is used to train your model to assess its accuracy. You will need a new dataset to validate the model because it already "knows" the training data.

3.4 Classifier to identify type of skin disease

Five machine learning techniques CART, SVM, Decision Tree (DT), Random Forest (RF) and GBDT are used for skin disease classification prediction. The best accuracy found among these different techniques was 95.90% for GBDT.

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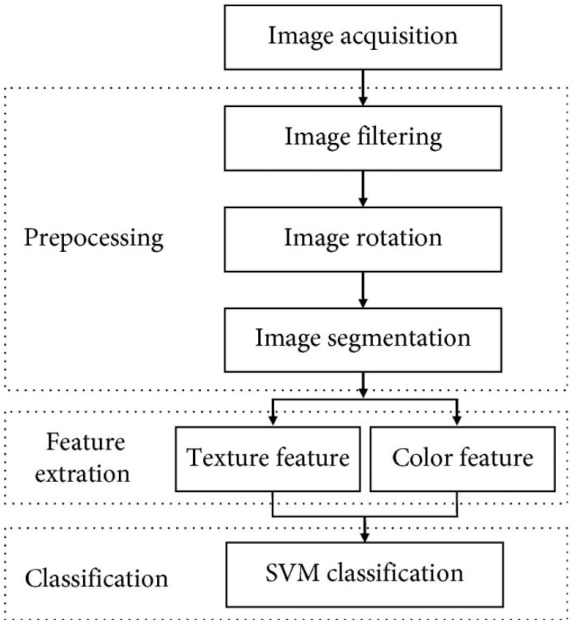


IV. ALGORITHM USED

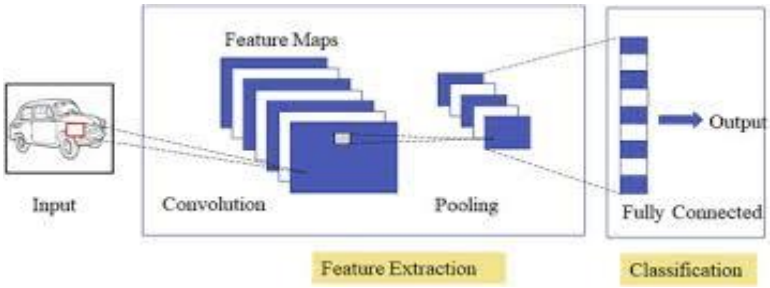
4.1 Convolutional Neural Network (CNN)

CNN A convolutional neural network (Convent/CNN) is a deep learning algorithm that takes an input image, assigns importance (learnable weights and biases) to aspects/objects in the image, and compares them to each other. others. A distinguished convolutional neural network is a type of neural network commonly used to analyze visual images by processing data using a grid-like topology. It is also known as convolutional network. Convolutional neural networks detect and classify objects in images.

Convolutional neural networks are specialized for image and video recognition applications. CNN is mainly used for image analysis tasks such as image recognition, object detection, and segmentation.

There are three types of layers in a convolutional neural network:

1. **Convolutional layer:** In a typical neural network, each input neuron is connected to the next hidden layer. In a CNN, only a small fraction of the input layer neurons are connected to the hidden layer of neurons.
2. **Pooling layer:** The grouping layer is used to reduce the dimension of the feature map.Inside the hidden layers of a CNN there will be multiple layers of activation and pooling.
3. **Fully connected layers:** Fully connected layers form the last layers of the network. The input to the fully connected layer is the output of the last pooling layer or convolutional layer, which is flattened and then fed into the fully connected layer.



V. MATHEMATICAL MODEL

Let S be a closed system. Ip, Op, Ss, Su, Fi, A=S get states Su by selecting system inputs and performing miscellaneous actions from activity set A.

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S=Ip, Op, Ss, Su, Fi, A Where, IP1=Username, Password and an image a collection of actions= A=F1,F2,F3,F4 where F1 = random from given data set F2 Select Samples = create a set of for each sample F3 = get a set of predictions. F4 = votes for each expected result. S=a group of users, Ss = stationary status, successful registration and login status, scan success. Error Condition (Fi)

5.1 Objects

1) Input1: Ip1=Username, Password 2) Input2: Ip2=image
1) Output1: Op1=set
2) Output2: Op2=Voting
3) Output3: Op3 = Highest number of votes prediction result Same as the final results of prediction.

VI. EXISTING SYSTEM

Some of the existing systems for skin disease identification using image processing include:

- **Skin Cancer Detection System (SCDS):** This system uses a support vector machine (SVM) classifier to classify skin diseases as either benign or malignant. It achieved an accuracy of 88.7% on a dataset of skin images.
- **Skin Disease Detection System (SDDS):** This system uses a combination of colour, texture, and shape features to classify skin Diseases into 15 different disease categories. It achieved an accuracy of 90.1% on a dataset of skin images.

Overall, these existing systems for skin disease identification using image processing show promising results in accurately identifying and classifying skin Diseases. However, further research and development are needed to improve their accuracy and effectiveness in real-world clinical settings.

VII. PROPOSED SYSTEM

The system we are proposing is a Machine learning-based system that uses a Convolutional neural network (CNN) to classify skin diseases. It achieved an accuracy of 83% on a dataset of skin images. The Skin Disease Detection System involves several elements, such as the processing of the image and training of the system using machine learning (CNN).

The module is divided into two parts, First is for data collection where the data is collected and the image is acquired and then further processed, while the second part is where the processed image is separated into segments is then put in the classifier engines where the classifier identifies the type of skin diseases that the image contains using the dataset available.

This System helps us get more accurate results as compared to the existing systems as they have better accuracy in identifying the different types of diseases. This system helps us get a better hold of the knowledge required for identifying skin diseases. The Accuracy of this system only increases as we increase the size of the dataset with a larger dataset we would have more data to refer to and this will help us in better identifying the disease and increase the accuracy every time.

VIII. RESULTS

An intial training gives the output accuracy of 83% approximately. In our project we initially tested for five diseases and classify their name correctly and which can be nearly increased in future. A large dataset can increase the accuracy to more than 90% and this output generated which is recognised skin illness, is displayed in the graphical user interface(GUI).

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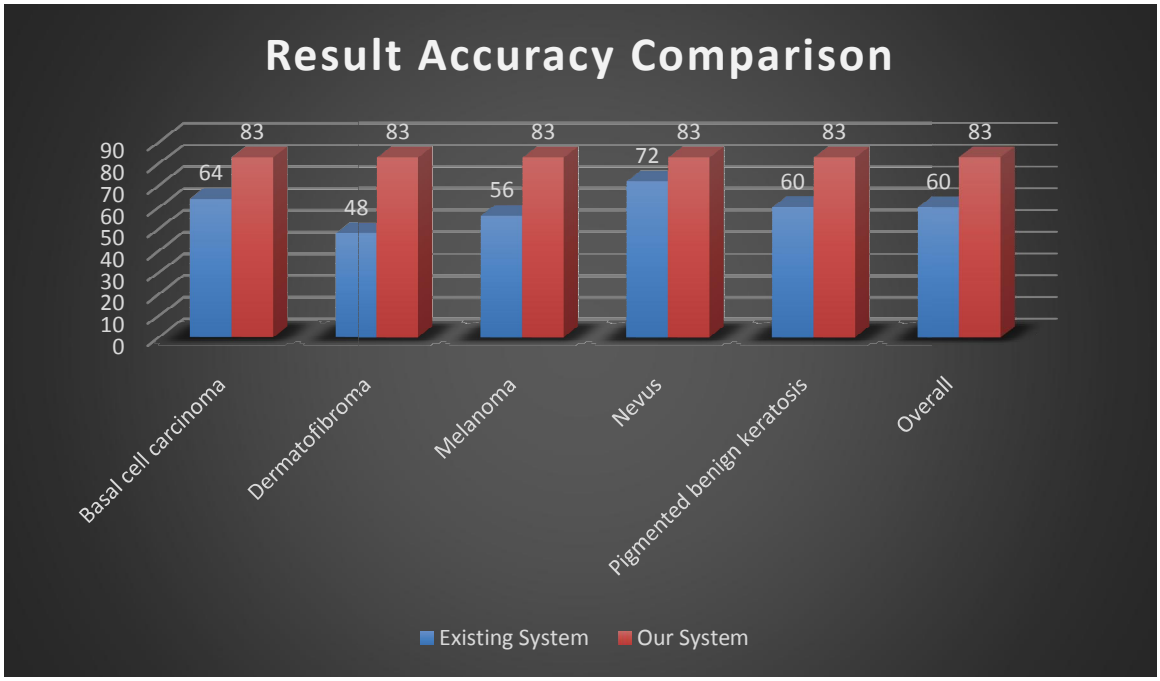

IX. FUTURE SCOPE

The detection of skin diseases by image processing is a booming field with great future potential. Advanced imaging technology and machine learning algorithms enable more accurate and faster detection and diagnosis of skin diseases. There are several advantages to using image processing to detect skin diseases. Such as:

1. It is painless, making it an attractive option for patients.
2. Allows earlier detection of skin diseases, which increases the chances of better treatment outcomes and may or may not help reduce health care costs.
3. The technology can be used in remote areas of the world where access to dermatologists is very limited.

Now that smartphones and other mobile devices are equipped with cameras, the future of skin disease detection using i mage processing looks bright, as patients can take images of their skin and upload them to cloud based systems for analysis. This would allow doctors to remotely diagnose skin diseases without requiring patients to travel to a clinic.In addition, the use of machine learning and artificial intelligence algorithms in image processing is growing massively. The technology improves the accuracy of skin disease detection and diagnosis by analyzing large amounts of data and identifying patterns that are difficult for humans to spot.These tec hnologies will also be able to provide personalized treatment recommendations based on a specific patient's medical his tory and skin type.The range of detection of skin diseases by image processing looks very promising and we can always expect continued progress in this field in the years to come, as well as a brighter future for the medical sector of dermat ology.

X. CONCLUSION

The skin is the largest part of the human body Skin diseases are the most common cause of human disease. Skin diseases are increasing every day and are a heavy burden in India. The burden is due to infectious diseases and infectious diseases, in order to reduce the development and spread of skin diseases, we have created a skin disease detection system using image processing and CNN (Convolutional Neural network). This disease detection is a python porotype model, so its results are not so accurate, they miss, but most of the results are 80-90% accurate. The system was proposed because clinical procedures are time-consuming and sometimes fail to diagnose the exact disease. These techniques are therefore very useful for detecting skin diseases.

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This Paper presents the role of CNNs, various image processing techniques, in the efficient and accurate detection of skin diseases. This article identifies and classifies 5 disorders. Here we summarize a brief description of the system and implementation method for detecting skin diseases.

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