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# Prediction and Classification of Skin Diseases using Deep Learning Technique

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**ABSTRACT:** One of the most frequent forms of sickness in the world is a disease of the skin. Lasers and photonics have made it more simpler and quicker to diagnose skin problems because to advances in medical technology. They are expensive, but they are also relatively restricted in scope. A dermatological screening system that uses image processing methods may be developed at an early stage. Skin disease diagnosis might be improved with the use of a computer-aided method, it is claimed. Images and Deep Learning are used to detect skin disorders in this study.

**KEYWORDS:** Dermatological, Automated Screening, Deep learning techniques.

## I. INTRODUCTION

Since the skin is the body's biggest organ, problems with it are common. The skin may be infected by up to 1500 different illnesses. Despite the rapid expansion of our knowledge, we are still mostly ignorant of the symptoms of the majority of these illnesses. As a result, dermatologists have a difficult time identifying them. Every aspect of our lives has been impacted by technology, and the medical industry is no different. Patients and clinicians may benefit from a variety of medical systems, from the registration procedure to the use of technology in illness diagnosis.

This includes the epidermis, subcutaneous tissues, blood vessels and lymphatic vessels, nerves and muscles. The breakdown of lipids in the epidermis may be halted by liquid, improving the skin barrier. Skin illnesses may be caused by a variety of organisms, including fungi, bacteria, allergies, or microorganisms that alter the skin's texture or colour [1]. Cancerous cells may develop in the skin over time as a result of long-term skin conditions. As soon as possible, treat skin illnesses to prevent them from worsening and spreading. When it comes to determining how various skin disorders impact individuals, imaging technology is increasingly being employed. Many skin conditions might take months to manifest symptoms, making treatment time consuming and laborious. Dermatologists were unable to generalise from previous computer-aided categorization work because there was little data and the emphasis was on conventional activities like dermoscopy, which uses skin surface microscopy to examine the skin. Dermoscopy is a standard tool in dermatology. Dermatological illnesses may be sorted out fast and precisely using computer-aided diagnostics [3] so that the appropriate therapy can be administered depending on the patient's symptoms. Using supervisory methods to reliably diagnose skin disorders and reduce the cost of providing a diagnosis is shown in this study

Dermatological illnesses may appear in a wide variety of forms, there aren't enough dermatologists to go around, and the necessity for a speedy and accurate diagnosis demands data-driven diagnostics. Lasers and photonics have improved medical technology's ability to detect skin disorders. However, the expense of this kind of diagnostic is still prohibitive.

Images and data may be classed using deep learning models [4–7], which are quite effective. There has long been a need in the medical industry for a more precise technique to detect abnormalities and classify diseases, whether by X-rays, MRI, or computer tomography (CT). A better treatment plan may be devised if physicians know precisely what illness a patient is suffering from. As the issue they are attempting to answer evolves, deep learning models can automatically recognise and adapt to these changes in the data they are presented with. Finding and exploring the characteristics that haven't been disclosed by data patterns will be done by deep learning models based on the inferred data. Because of this, they are quite effective even with low-performance models. An picture of a skin disease afflicted region led the scientists to consider using a deep learning model to identify the condition's kind from the image they saw.

The most frequent disease in the world is one that affects the skin. Diagnoses are very difficult and need a great deal of knowledge and expertise in the subject. An annual visit to the GP by 24% of patients with a skin condition is documented in a research. Undergraduate students are typically taught about dermatology in a variety of ways, which means they must take stock of what they currently know and how effectively it serves them in this field. Only Primary Care now treats around 90% of all skin problems.

If skin illness is diagnosed and treated early on, it seems that the majority of skin disease issues may be resolved. Patients who suffer from skin problems may find it difficult to achieve their full potential [6]. The best approach to treat skin problems is to detect them early, which is becoming more prevalent. When it comes to diagnosing skin problems as quickly as possible, general practitioners (GPs) play a crucial role [1].

Since the dawn of time, people across the globe have experimented with traditional medicine. A dearth of medical competence and the expensive expense of medical techniques and equipment have thwarted these efforts. The majority of skin problems may be traced back to environmental and other causes. Most individuals in the world still do not have simple access to the instruments they need to detect these illnesses early on in their course. This study explains how to seek for several subtypes of this illness. The user provides a picture of the skin condition to the system. Finally, a CNN algorithm is used to identify what kind of sickness it is by extracting features and utilising the softmax image classifier. "Negative" results are returned when the system fails to locate any illness. As a result, we present here a novel Convolutional Neural Network-based approach to dermoscopy detection and categorization (CNN).

## II. LITERATURE REVIEW

It was discovered that cellphones may be used to detect six distinct types of skin illnesses by Vinayshekhar Bannihatti Kumar, Sujay S. Kumar, and Varun Saboo in 2016[1]. A two-step procedure is used to merge machine learning with computer vision. There are two phases to computer vision. To begin, the picture was pre-processed using eight different methods. Grayscale conversion, sharpening, median filter, smooth filter, binary mask, RGB extraction, histogram and sobel operator were the methods used to convert the picture to grayscale. To train the Maximum Entropy model and the Feedforward Artificial Neural Network, we employed the retrieved features.

In 2016, Pravin S. Ambad1 and Asad Shirsat developed an image analysis method that can identify skin disorders. In order to detect and prevent skin problems at an early stage, they devised a method. They concentrated on skin cancer, psoriasis, and dermatophilosis, among other conditions. Based on statistical parameter analysis, the system is Entropy, texture index, standard deviation, and correlation are statistical metrics. Different moles or skin patches may be photographed by the system's user. Based on the picture's retrieved attributes, the system will analyse the image and categorise it as normal or as having one of the conditions listed above. The user will be advised to consult a doctor if the mole is atypical or melanoma. The photos are initially processed with a median filter in order to remove any unwanted artefacts. After that, approaches for picture enhancement and statistical analysis are used. An additional classifier divides the picture into three categories: normal, melanoma, and dermo. This classifier uses a two-stage classification system. The first level classifies the image as normal or abnormal.

researchers W.C. Ellawala, G N Abeysekar, and R J Amalraj, 2015[3] have made the following proposal: Only three types of skin conditions may be identified by users, and the system can then provide therapy or advise. Many image processing and data mining methods are also used. For example, median and Gaussian filters were employed to enhance skin photos, followed by thresholding segmentation and the extraction of morphological characteristics from the improved images. The user's information and these traits are put into a variety of classifiers (AdaBoost, BayesNet, J48, MLP, Naive Bayes, and Naive Bayes).

For the first time, a study has shown that a combination of genetic, environmental, and behavioural factors may lead to a reduction in the risk of Alzheimer's disease. If detected and treated early, melanoma, a deadly form of skin cancer,

may be cured. Image processing may be used to detect melanoma by using a variety of segmentation approaches. Using the borders of the contaminated area, segmentation is discussed.

It has been suggested by Rahat Yasir, Md. Ashiqur Rahman, and Nova Ahmed, 2014[5,] to diagnose various illnesses from colour photos using computer vision algorithms. With an accuracy rate of 90 percent, the device is able to accurately diagnose nine distinct forms of dermatological skin problems. They have made use of the following ten capabilities: Using user input, we were able to extract 7 variables (such as "type" and "colour" of liquid), and a picture provided three more.

For example, Sanjay Jaiswar, Mehran Kadri, and Vaishali Gatty (2014)[8] presented a computer-aided approach for identifying Melanoma skin cancer using image processing methods. Preprocessing methods such as image illumination equalisation, colour range normalisation, image scale fitting, and picture resolution normalisation were used in the system's image processing. After then, the photos were segmented.

S. Arifin, G. Kibria, A. Firoze, A. Amini, and H. Yan (2012)[9] argue that instead of seeing a doctor, colour photographs may be used to determine what's wrong with the skin. There are two sections to the system. This section uses colour image processing, k-means clustering, and colour gradients to identify sick skin. To categorise the illness, artificial neural networks are used. The device was tested on six different forms of skin disorders. It was 95.99 percent accurate in the first stage, and 94.016 percent correct in the second stage.

### Summary Of Literature Survey

They employed typical deep learning technologies to identify skin problems after reading through all of their publications. It's difficult to attain the outcomes you need using standard methods since they come with their own set of dangers. Because of this, traditional methods can not guarantee accuracy and can only manage a limited number of samples. In order to get better results with more samples and more accuracy, we want to use CNN for this project.

### Problem Statement

More and more people are suffering from skin disorders these days. Many of these illnesses may be deadly, particularly if they aren't diagnosed and treated early on in their development. Most of the time, physicians have a good sense of what the problem is and what the best course of action is. They may begin by searching for further evidence that their theory is true, and if it isn't, they may have overlooked alternative diagnosis. In the same way that every human search that begins with terms supplied by the user is affected by bias, physicians are affected by it as well. For another thing, starting with symptoms and working backwards may lead to the doctor favouring one diagnosis over another when an unrecognised or undervalued symptom is really the cause of the patient's condition. This may lead to the patient being misdiagnosed.

In regions (particularly in Low and Middle Income Countries) where medical specialists may not be accessible, unqualified, or able to satisfy an urgent medical demand, relying heavily on them for medical picture identification analysis is a major challenge (such as dermatological- related). We need a better, more controllable solution as soon as feasible in order to remove these human biases and dependencies as much as possible.

### Existing System

With a maximum accuracy of 75%, the prior models of automated skin identification were only able to detect six skin illnesses. As a result of using this model, we are able to achieve a better level of accuracy and forecast more illnesses than previously possible. What kind of sickness it is, as well as where the closest physicians are, may be found in this information.

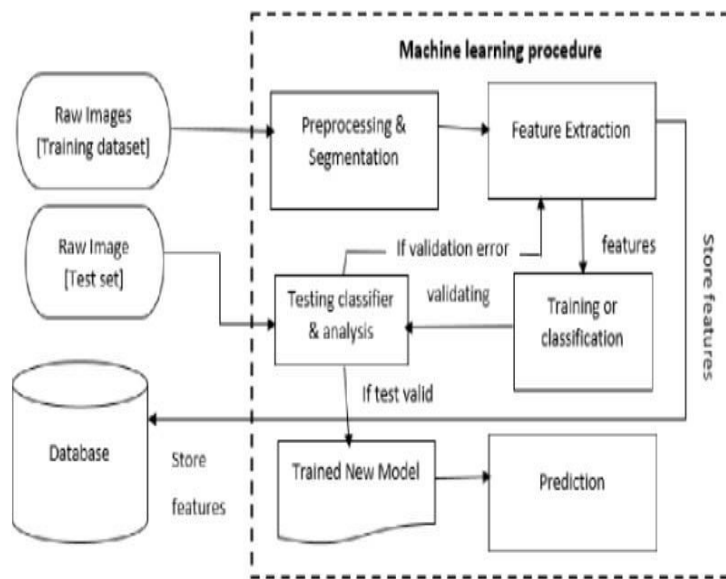
### Proposed Solution

People's comments on their skin conditions may be used to make predictions about future skin disorders using the suggested technique. The suggested system uses a hybrid architecture of image processing and Deep Learning approaches to rapidly and correctly identify the condition. Features such as segmentation and feature extraction are extracted during image processing. Processing, training, and detection are all parts of the machine learning process. The 2D Wavelet Transform technique is used in the proposed system to extract skin-color, texture, and shape information from photographs. Images are used to determine the correlation coefficients. These values are fed into the classifier model. To categorise data, the suggested system makes use of a convolutional neural network (CNN). Actinic keratoses, basal cell carcinomas, benign keratoses-like lesions, dermatofibromas, melanocytic nevi, melanoma, and vascular lesions may all be found using the classifier model. The findings are correct when neural networks are combined. Doctors would be able to use the suggested system to identify and treat skin problems, and the system would act as a shared knowledge base. This suggested method examines a wide range of skin problems and saves both time and money for consumers. A

Python script based on Pycharm is used to collect experimental data for this system.

### III. SYSTEM DESIGN

#### System Architecture



#### Methodology Presented

Figure below shows the proposed methodology for skin disease identification.

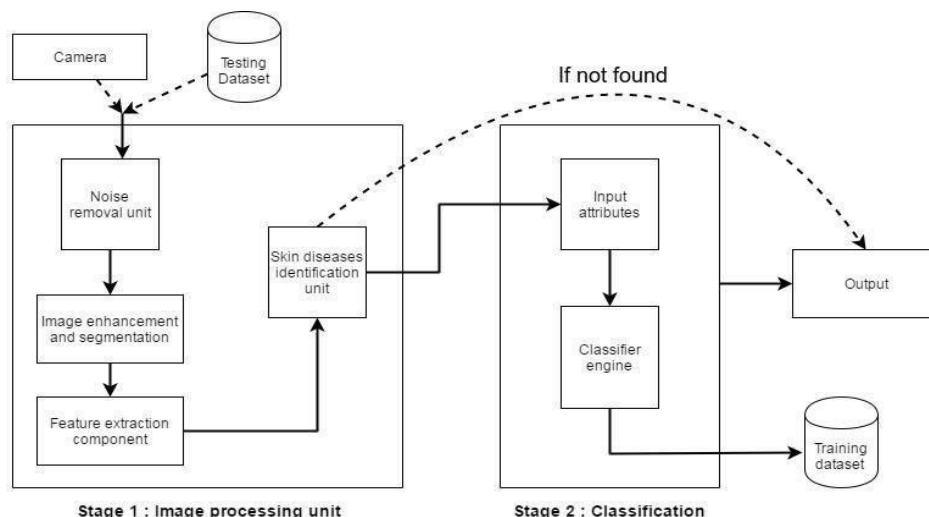


Figure: Methodology Diagram

The system can be broadly categorized into following major phases:

- ImageAcquisition:A camera or a device that keeps photos locally are used to capture the photographs. When it comes to images, no matter where they originate from, they must be clear and correct. High-quality images are required for this.

- Noise, such hair and skin colours, is removed from the picture in this stage to ensure that the analysis is not hampered. It is possible that the picture that is being fed into the algorithm is not the correct size. It's crucial that the algorithm's size requirements be met.
- It's an area to store photos of training and test data: Training data is required for supervised learning, which is the case here. The testing dataset is comprised of the photos captured throughout the acquisition process[2].
- A classification system for identifying the specific kind of skin illness. The last layer of the network, the Softmax classifier, is utilised in this situation to determine the true likelihood of each label being assigned. The architecture consists of two components. Processing and grouping units for digital photos. Noise and undesirable skin portions may be removed by using an image processing equipment. In order to distinguish it from regular skin, the picture will be broken up into many parts. Finally, the image's characteristics will be analysed to determine whether or not the skin is diseased.
- Noise removal unit: Removes blemishes and stray hairs from the image.
- By enhancing the image and separating it into distinct pieces, this helps the damaged region to stand out from the rest of the skin[4].
- Finding the characteristics is an essential first step in every classification challenge. Features are critical for both teaching and assessment. Information included in this feature will help researchers determine what ailment the picture depicts[4].
- It is the job of the Skin Disease Identification Unit to determine whether the skin is malignant or not.
- The image's significant qualities, such as asymmetry, border, colour, diameter, evolution, and so on, are now passed on to the classifier component of the algorithm, which is called Part II[6].
- Pictures are assigned to one of many pre-defined disorders via an image classifier (here softmax classifier is used) [5,6].

#### IV. RESULTS AND DISCUSSION

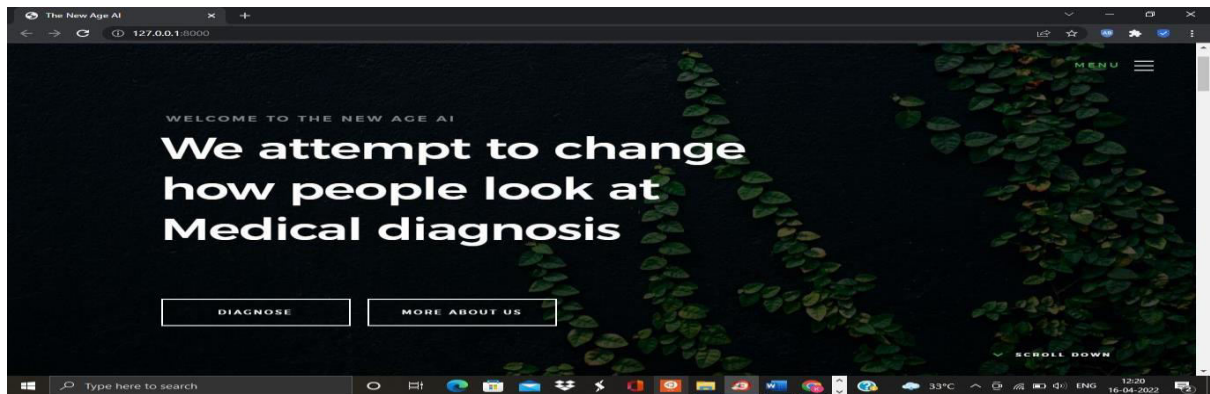
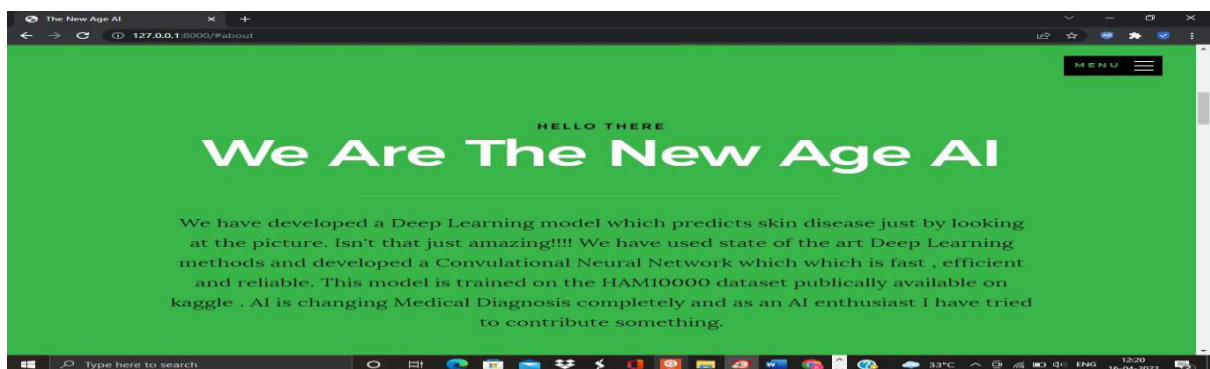


Fig: HomePage



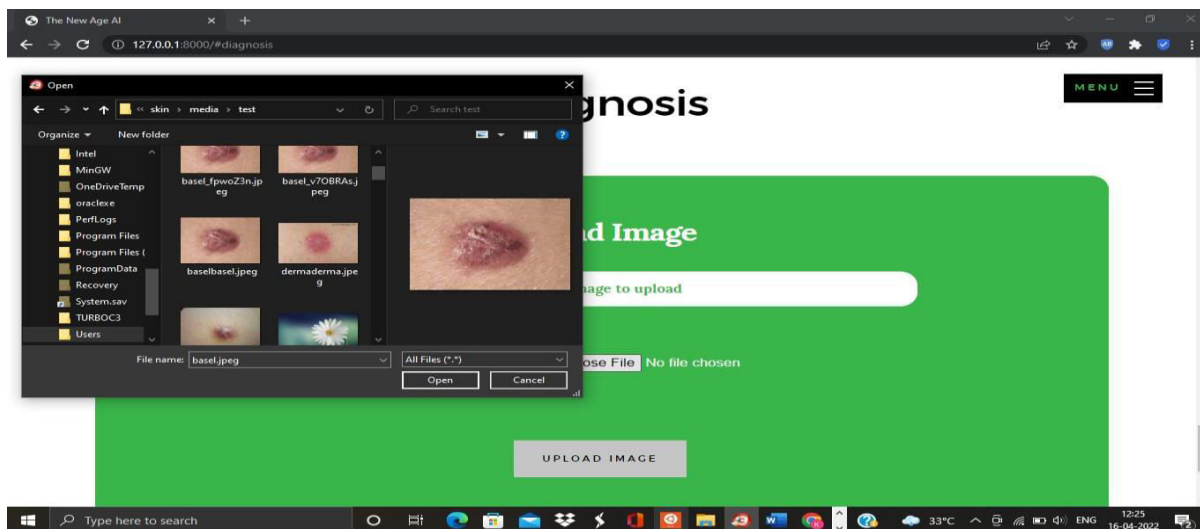


Fig:UploadingImage

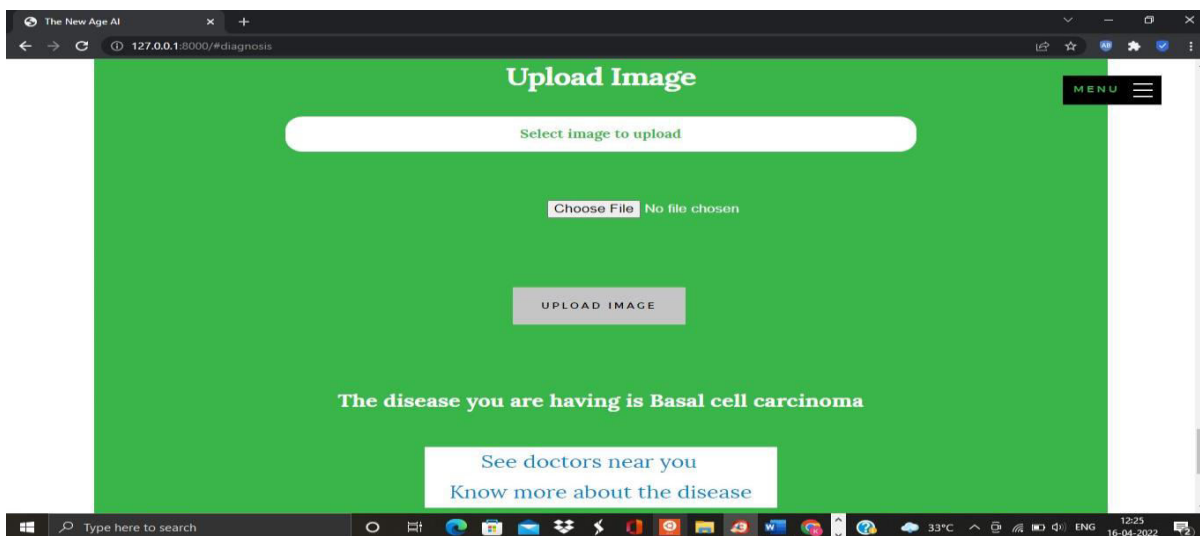


Fig:Result Page

## V. CONCLUSION

This project may be used to learn about the classification of skin disorders and to locate various skin conditions. In recent years, medical technology has advanced significantly, making it more quicker and faster than ever before to determine what's wrong with one's skin. However, the cost of these testing is still prohibitive and restricted. According to the literature analysis, the existing method is not as accurate or effective at forecasting the number of illnesses as it might be. For this reason, we have devised a strategy to develop an automated system that uses deep learning methods to better detect and categorise skin illnesses.

## VI. FUTURE WORK

In order to improve the model, it should be equipped with the capacity to learn from its own errors and to learn from new experiences. To train the model, the amount of effort required is significantly reduced. There are a number of steps that must take place before this model can be used to assess the impact of the characteristics retrieved for each method. Despite the large amount of data, the researchers recommend that future studies focus on biomarker-based feature extraction activities. Additionally, biomarkers may be used to identify a person's illness by looking at genomic, protein



sequence, and pathology data. It's a good idea to employ a user-friendly smart device app that can display alerts and help patients and physicians communicate while transferring physiological and biological data across health networks. This will ensure the secure transmission of data.

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