Automated Skin Diseases Detection Using Image Processing Techniques

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***Abstract*—Skin diseases are a major global health concern affecting people of all age groups. Early and accurate diagnosis plays a crucial role in effective treatment and prevention of severe complications such as melanoma. Traditional diagnosis methods depend heavily on expert dermatologists, making the process subjective, time-consuming, and inconsistent. This paper presents an automated skin disease detection system using image processing techniques.**
The proposed approach involves preprocessing of skin images, segmentation of affected regions, extraction of meaningful texture features, and classification using a machine learning classifier. The entire system is implemented using MATLAB. Experimental results demonstrate that the proposed method provides reliable performance and can assist dermatologists as well as serve as an early diagnostic tool, especially in resource-limited environments.

***Index Terms*—Skin Disease Detection, Image Processing, MATLAB, Segmentation, Feature Extraction, Classification**

I. INTRODUCTION

Skin diseases are among the most common health problems worldwide and affect individuals irrespective of age, gender, and lifestyle. Diseases such as acne, psoriasis, eczema, and melanoma require early diagnosis
to prevent severe health complications. Conventional diagnostic methods rely on visual inspection by dermatologists, which is often subjective and prone to human error. Moreover, access to expert dermatologists is limited in rural and underdeveloped areas.

Advancements in image processing and computer-aided diagnosis systems have enabled automated approaches for medical diagnosis. Image processing techniques allow efficient analysis of skin images and extraction of useful information for disease identification. This paper proposes an automated skin disease detection system using image processing techniques implemented in MATLAB to improve diagnostic accuracy and reduce dependency on expert diagnosis.

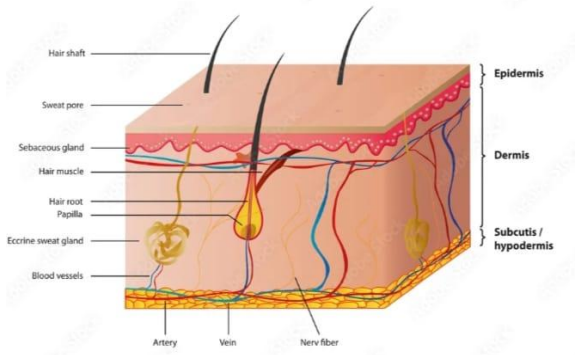

Fig 1 Schematic Representation of the skin

II. LITERATURE REVIEW

Several researchers have proposed automated skin disease detection systems using image processing and machine learning techniques. Texture-based feature extraction methods such as Gray Level Co-occurrence Matrix (GLCM) have been widely used to analyze skin lesion patterns. Support Vector Machine (SVM) classifiers have shown effective performance in classifying skin diseases based on extracted features.

Recent studies have explored deep learning techniques such as Convolutional Neural Networks (CNNs) for skin disease classification. Although CNN-based methods achieve high accuracy, they require large datasets and high computational resources. Traditional image processing techniques remain suitable for cost-effective and interpretable diagnostic systems, especially for academic and real-time applications.

III. PROPOSED METHODOLOGY

The proposed automated skin disease detection system consists of the following stages:

A. Image Acquisition

Skin images are collected from a dataset or captured using a digital camera and provided as input to the syst

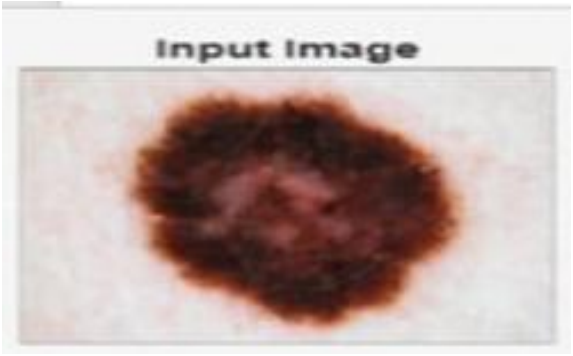

Fig 2 Input Image

B. Preprocessing

The input image is resized and filtered to remove noise and enhance image quality. The RGB image is converted into a grayscale imageto reduce computational complexity.

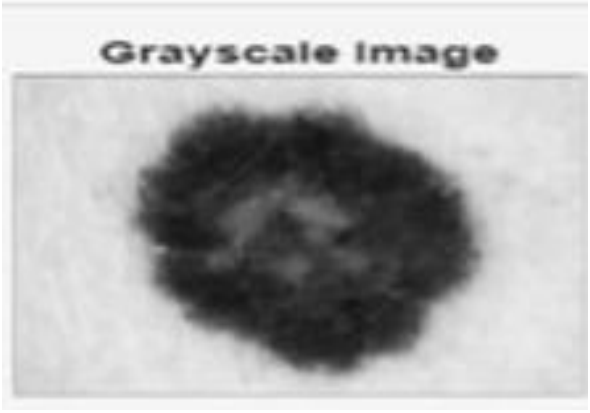

Fig 3 Grayscale Img

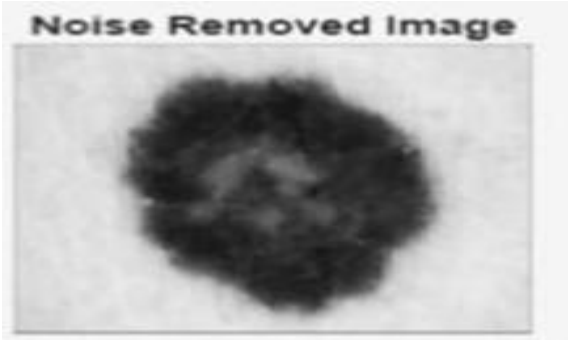

Fig 4 Noise Removed Img

C. Image Segmentation

Image segmentation is performed to isolate the affected region from the background. Thresholding techniques are used to separate diseased regions based on pixel intensity values.

Fig 5 Segmented Image

D. Feature Extraction

Texture features are extracted from the segmented image using Gray Level Co-occurrence Matrix (GLCM). Features such as contrast, correlation, energy, and homogeneity are calculated.

E. Classification

The extracted features are fed into a classifier to identify the presence of skin disease. The classifier categorizes the input image as normal or abnormal based on feature values. The entire methodology is implemented using MATLAB.

IV. RESULTS AND DISCUSSION

The proposed system is tested using multiple skin images. The system effectively identifies affected regions and classifies skin diseases accurately. MATLAB-based implementation provides a graphical user interface to visualize intermediate processing steps and final results. The automated

system reduces diagnostic time and provides consistent results compared to manual diagnosis methods.

Fig 6 skin Disease predicted as Malignant

Fig 7 Skin Disease Predicted as Benign

Advantages

The proposed automated skin disease detection system using image processing techniques offers several advantages. The system reduces the dependency on manual diagnosis by dermatologists and minimizes human errors associated with visual inspection. It provides fast and consistent results, making it suitable for early detection of skin diseases. The use of image processing techniques ensures objective analysis and improves diagnostic accuracy. Implementation using MATLAB makes the system flexible, easy to modify, and suitable for academic as well as real-time applications. Additionally, the system is cost-effective and can be deployed in resource-limited environments where expert medical facilities are not readily available.

Applications

The automated skin disease detection system has a wide range of applications in the medical and healthcare domain. It can be used in hospitals and diagnostic centers to assist dermatologists in identifying skin diseases at an early stage. The system can also be deployed in rural healthcare units where access to experienced dermatologists is limited. It is useful for telemedicine applications, allowing patients to upload skin images for remote diagnosis. The proposed system can be utilized as a decision-support tool in clinical environments and as an educational tool for medical students. Furthermore, it can be extended to mobile-based healthcare applications for preliminary self-assessment and continuous skin health monitoring.

V. CONCLUSION

This paper presented an automated skin disease detection system using image processing techniques. The system preprocesses skin images, extracts texture features, and classifies skin diseases efficiently. MATLAB-based implementation demonstrates the feasibility of the proposed approach for early diagnosis. Future work can include integration of deep learning techniques and larger datasets to improve classification accuracy and extend the system to multiple skin disease categories.

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