



"DEVELOPMENT OF AN AI-BASED SKIN DISEASE IDENTIFICATION SYSTEM" USING CNN AND IMAGE PROCESSING FOR EARLY AND ACCURATE DIAGNOSIS

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Abstract: Skin diseases pose significant challenges in the healthcare domain due to their complex and often overlapping symptoms. Early and accurate diagnosis is vital for effective treatment. This paper presents an approach that leverages Convolutional Neural Networks (CNNs) integrated with image segmentation techniques for the classification and detection of skin diseases. The experimental evaluation on publicly available skin disease datasets demonstrates that the model outperforms several existing approaches in terms of accuracy, precision, and recall. This research aims to contribute towards developing a practical tool that can assist dermatologists and medical professionals in automating skin disease diagnosis. Future improvements may include integration with mobile health platforms and expanding the dataset diversity. The proposed methodology underscores the potential of deep learning in medical image analysis, especially for dermatological applications where early detection can make a substantial difference in treatment outcomes. Skin diseases are a growing concern worldwide, requiring early and accurate diagnosis for effective treatment. Traditional methods rely on dermatologists, which can be time consuming and inaccessible in remote areas. This project proposes an AI-powered skin disease detection system using Convolutional Neural Networks (CNN) and image segmentation techniques. The model processes skin lesion images, applies preprocessing filters, extracts features, and classifies diseases with high accuracy.

KEYWORDS: AI in Healthcare, Skin disease identification, Skin lesion Classification, Medical Image Analysis, Convolutional neural network (CNN), Image Classification, Artificial Intelligence, Pattern Recognition, Feature Extraction, Image Segmentation, Specific Skin Conditions, Image Preprocessing, Shape Analysis.

I. INTRODUCTION:

In the current digital healthcare environment, initial diagnosis and treatment of skin conditions often rely heavily on physical consultations and manual evaluations, which are time-consuming, resource-intensive, and inaccessible for individuals in remote areas. Existing platforms typically require user registration, complex interfaces, or specialized hardware, creating barriers to timely self-assessment. Moreover, many systems lack real-time interactivity, preview functionality, or straightforward integration for further treatment processes. This project addresses these challenges by introducing a lightweight . Skin-related disorders are among the most common health issues worldwide, yet access to timely diagnosis and treatment remains limited, especially in underserved or remote regions. Traditional diagnosis methods often require physical consultations, which can be time-consuming and inaccessible to many.

This project presents the development of an Image Upload and Treatment System—a lightweight, user-friendly web solution designed to simplify the initial stage of skin condition assessment. The system allows users to upload and preview skin images in real-time, enabling early-stage evaluation without the need for login or registration. Built with HTML, CSS, and JavaScript, the platform is intended to serve as the foundation for future AI integration and backend processing, thereby improving accessibility and supporting faster decision-making in the healthcare process. The system is designed to function as a standalone platform, eliminating the need for user registration or complex setup, and prioritizes user-friendliness and accessibility. It includes features such as real-time image preview, responsive interface design, and a treatment initiation trigger that can be linked to backend or AI modules in future enhancements.

II.OBJECTIVE:

The primary objective of this project is to develop a simple and interactive web-based system for medical image upload and treatment that enhances user accessibility and diagnostic support. Specifically, the system aims to Enable users to upload medical images—particularly skin-related—without requiring login or registration. Provide real-time image preview for instant visual confirmation.Lay the groundwork for integrating AI-based analysis or treatment logic in future versions.

1.Automated Diagnosis System

Develop an intelligent system capable of automatically detecting and classifying various skin diseases from image inputs.

2. Deep Learning Integration

Implement Convolutional Neural Networks (CNN) to extract features and perform accurate classification of skin lesions.

3. Image Preprocessing

Apply techniques such as noise removal, contrast enhancement, and segmentation to improve input image quality and model performance.

4. Reducing Clinical Dependency

Provide a preliminary diagnostic tool that reduces the need for immediate dermatologist consultation, especially in initial screening.

III.EXISTING IDEA:

A chatbot, or Traditional skin disease diagnosis primarily relies on dermatologists' visual inspection or dermatoscopic analysis, which can be subjective, time-consuming, and inaccessible in remote areas. Early automated approaches used machine learning algorithms like SVM and KNN on manually extracted features such as color and texture, but these lacked accuracy and scalability. With the advancement of deep learning, Convolutional Neural Networks (CNNs) have become popular for skin lesion classification, particularly using datasets like HAM10000 and ISIC. Some commercial mobile apps and teledermatology platforms also offer skin condition detection, but they are often limited in scope, accuracy, or accessibility. Existing solutions may not provide real-time results, are commercially restricted, or lack support for a wide range of skin diseases. Hence, there is a growing need for an open, accurate, and real-time AI-based skin disease identification system, which your project aims to fulfill.

Disadvantages:

1.Limited Accuracy in Traditional Methods

Early machine learning models rely on manual feature extraction, which may not capture complex skin patterns, leading to lower accuracy.

2.Subjectivity in Manual Diagnosis

Diagnosis by dermatologists can vary based on experience, lighting, or interpretation, making it less consistent.

3.Inaccessibility in Rural Areas

Many people in remote or underserved regions lack access to dermatologists or advanced diagnostic tools.

4.High Cost of Commercial Apps

Mobile applications like SkinVision or Aysa often charge users or require subscriptions, limiting use among the general population.

5.Data Privacy Concerns

Uploading personal skin images to third-party apps can raise privacy and data protection issues.

6.Lack of Real-Time Results

Some teledermatology platforms require wait times for results, which is not ideal for quick screening.

IV.SIMILAR AI FOR SKIN DISEASE:

1. Stanford University's Deep Learning Model for Skin Cancer Detection:

Researchers at Stanford University developed a cutting-edge deep learning algorithm designed to detect skin cancer with an accuracy that matches trained dermatologists. The model was trained using a massive dataset of over 129,000 images spanning 2,032 different skin diseases. Using Convolutional Neural Networks (CNNs), the model was capable of distinguishing between benign and malignant skin lesions. In clinical testing, the model's diagnostic performance matched that of 21 board-certified dermatologists, making it a benchmark in AI-assisted dermatology. This project highlighted the potential of AI in replacing or supplementing early-stage clinical diagnosis, especially in resource-limited environments.

2. MobileNet V2 and LSTM-Based Skin Disease Classification:

This project proposed a novel deep learning architecture combining MobileNet V2 and Long Short-Term Memory (LSTM) networks for skin disease classification. The system was trained using the HAM10000 dataset, which contains over 10,000 skin lesion images across multiple disease classes. It was particularly designed for lightweight, mobile-based deployment, making it suitable for use in areas with limited computational resources. The model achieved impressive classification accuracy—over 85%—and outperformed traditional CNN and fine-tuned neural network models. The integration of MobileNet ensured computational efficiency, while LSTM enhanced the temporal handling of image features, showing promise for real-time mobile diagnosis applications.

3. Skin Disease Detection System Using CNN:

This GitHub-based open-source project presents a complete solution for detecting and classifying skin diseases using Convolutional Neural Networks. The system can identify multiple skin conditions, including eczema, psoriasis, and melanoma, through an automated image classification pipeline. Built using Python and TensorFlow, the project offers a simple and interactive interface where users can upload images and receive diagnosis predictions. The model processes dermatological images through preprocessing, feature extraction, and classification stages. It includes training and testing modules, accuracy evaluations, and visualization of performance metrics, making it a strong academic and practical reference.

4. Deep Learning-Based Skin Disease Classification:

This project focuses on classifying two skin diseases—Psoriasis and Melanoma—using deep learning architectures like CNN and ResNet-9. Trained on a curated dataset of 1,169 skin lesion images, the model achieved a high classification accuracy of 90%. It uses image preprocessing techniques, followed by deep feature extraction and classification layers. The goal was to create a simple, accurate system that could help in early diagnosis and improve patient outcomes. The project is well-documented on GitHub and serves as a useful example of small-scale yet effective deep learning application in healthcare.

V.PROPOSED IDEA:

The proposed system aims to develop an AI-based skin disease identification tool that leverages Convolutional Neural Networks (CNN) and advanced image processing techniques to provide early, accurate, and accessible diagnosis of common skin conditions. Unlike traditional diagnostic methods, which depend heavily on dermatologists and can be time-consuming and subjective, this system automates the process by analyzing uploaded images of affected skin areas and classifying them into various disease categories such as eczema, psoriasis, acne, fungal infections, and more. The frontend allows users to easily upload images, while the backend processes the input using a trained CNN model. Image preprocessing methods like resizing, normalization, and augmentation are applied to enhance model accuracy. The solution is designed to be lightweight and scalable, making it suitable for deployment in mobile or web-based platforms, especially in

remote or resource-constrained areas. This AI-driven approach not only reduces the burden on healthcare professionals but also empowers individuals with a quick, preliminary diagnosis and encourages timely medical attention.

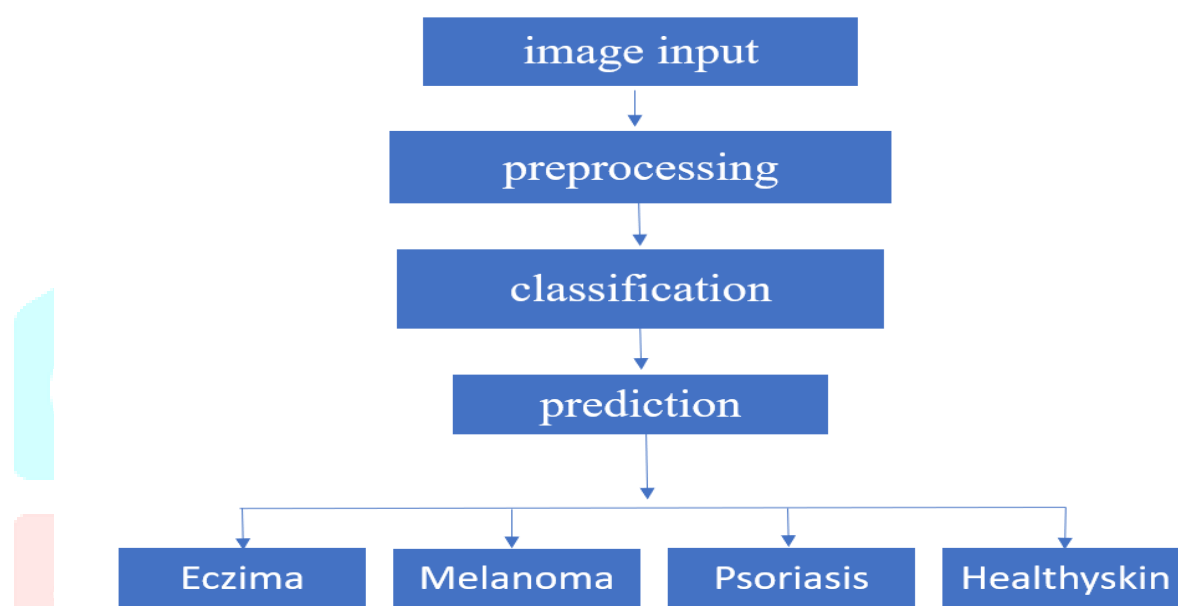
VI.PROPOSED ARCHITECTURE:

Image as Input: The process begins with an "Input Image," implying that the data being analyzed is visual.

Preprocessing Importance: The "Preprocessing" stage highlights the need to prepare the raw image data before feature extraction. This often involves steps to improve image quality or standardize the data.

Feature Extraction as a Key Step: "Feature Extraction" is a crucial stage where relevant information is extracted from the preprocessed image. The quality of these extracted features significantly impacts the performance of the subsequent classification.

Classification : The "Classification" stage aims to assign the input image to one of the predefined categories.



VII.CONCLUSION:

Accurate and timely identification of skin diseases is a critical aspect of healthcare, impacting patient outcomes and overall well-being. The field is rapidly evolving, with advancements in technology like artificial intelligence, machine learning, and advanced imaging techniques offering promising avenues for improved diagnostics. While traditional methods relying on clinical examination and biopsies remain essential, these emerging technologies hold the potential to enhance diagnostic accuracy, enable earlier detection, and even facilitate remote or point-of-care assessments. However, the successful integration of these technologies requires robust validation, diverse and representative datasets, and careful consideration of ethical and practical implications to ensure equitable and reliable access to effective skin disease identification for all. Continued research and interdisciplinary collaboration are crucial to fully realize the potential of these advancements in improving dermatological care.

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