

Smart Skin Health Detection: Psoriasis and Aging Analysis Using AI/ML

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Abstract: Skin diseases and premature aging are among the most common healthcare problems worldwide. Due to pollution, unhealthy lifestyles, stress, and lack of awareness, many people suffer from psoriasis, wrinkles, dryness, pigmentation, and other skin-related conditions. Traditional diagnosis methods depend on manual observation and dermatologist consultation, which may not always be accessible or affordable.

This research paper proposes a Smart Skin Health Detection system using Artificial Intelligence (AI) and Machine Learning (ML) for automatic psoriasis detection and aging analysis. The proposed system uses image processing techniques and Convolutional Neural Networks (CNN) to analyze uploaded skin images and predict skin conditions with improved accuracy. The Streamlit-based application provides real-time predictions, confidence scores, skincare recommendations, and awareness guidance. Experimental results

show that the system achieves reliable performance under normal conditions and supports smart healthcare monitoring. The

proposed work demonstrates the practical application of AI in dermatology and preventive healthcare systems.

Keywords— Artificial Intelligence, Machine Learning, Psoriasis Detection, Skin Aging, CNN, Image Processing, Healthcare Monitoring, Streamlit.

1. INTRODUCTION

Skin health plays an important role in maintaining overall human well-being and confidence.

Many people suffer from skin disorders such as psoriasis, wrinkles, pigmentation, acne, dryness, and premature aging due to environmental pollution, stress, poor diet, and unhealthy lifestyles. However, most skin problems remain undetected in their early stages because people often ignore

minor symptoms or do not have regular access to dermatologists.

Artificial Intelligence (AI) and Machine Learning (ML) have revolutionized the healthcare field by providing intelligent systems capable of image analysis, disease prediction, and pattern recognition. Medical image analysis using deep learning models has shown significant improvements in disease detection

accuracy and automation. The proposed system combines AI/ML techniques with image processing to provide a smart, affordable, and user-friendly solution for skin health analysis.

The Smart Skin Health Detection system allows users to upload skin images through a Streamlit-based web application. The uploaded image is processed using preprocessing techniques such as resizing, normalization, and noise removal. Features such as wrinkles, redness, scaling, and texture are extracted and analyzed using CNN-based deep learning models. The system predicts psoriasis symptoms and aging signs while providing personalized skincare recommendations and precautions.

2. Literature Survey

Researchers across the world have developed several AI-based systems for skin disease detection and healthcare monitoring. Esteva et al. introduced a deep learning approach for dermatologist-level skin cancer classification using CNN architectures. Their work demonstrated that AI systems can achieve high prediction accuracy comparable to medical experts.

Codella et al. proposed automated skin lesion analysis using convolutional neural networks and image processing techniques. Their study highlighted the effectiveness of feature extraction and deep learning for medical image classification. Similarly, researchers have applied machine learning algorithms for wrinkle detection, texture analysis, and skin aging prediction. Other systems focused on psoriasis detection using digital image processing techniques.

These systems analyzed skin redness, scaling, and texture variations for classification. However, most existing systems focus on a single disease or require complex medical infrastructure. The proposed system combines psoriasis detection and aging analysis in a single platform with a simple user interface suitable for general users.

3. Problem Statement

Skin diseases such as psoriasis and premature aging are becoming increasingly common due to environmental and lifestyle factors. Many individuals fail to recognize early symptoms, which can lead to severe complications over time. Manual diagnosis methods depend heavily on dermatologist availability and may be costly or time-consuming for people living in rural or remote areas. Traditional skin analysis systems may also produce inaccurate or delayed results due to human observation limitations. Therefore, there is a need for an automated AI/ML-based skin health detection system that can provide accurate, affordable, and fast diagnosis support. The proposed system addresses these challenges by using intelligent image analysis techniques and machine learning models for early skin disease detection.

4. Objectives

The main objectives of the proposed system are:

- To develop an intelligent skin health detection application using AI and ML.
- To detect psoriasis symptoms, wrinkles, dryness, and aging signs from skin images.
- To improve accuracy and speed of skin analysis using CNN-based deep learning models.
- To provide personalized skincare recommendations and awareness guidance.
- To support remote healthcare monitoring and preventive diagnosis.
- To demonstrate the practical implementation of AI in medical image analysis and healthcare applications.

5. Proposed System

The proposed Smart Skin Health Detection system is designed using a Streamlit frontend integrated with machine learning and image processing modules. Users can upload skin images through a simple and interactive interface. The uploaded image is processed in multiple stages for accurate analysis. The system architecture consists of the following modules:

1. User Interface Module
2. Image Upload Module
3. Preprocessing Module
4. Feature Extraction Module
5. CNN Prediction Module
6. Result and Recommendation Module
7. Database and Storage Module

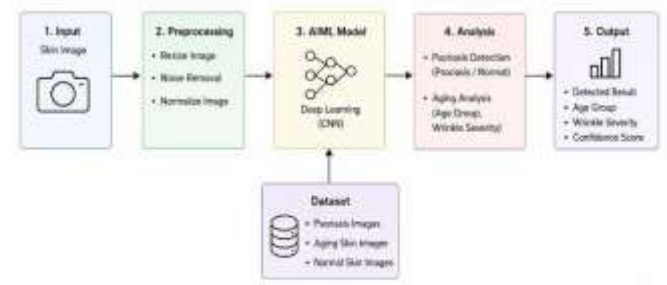


Fig 5.1

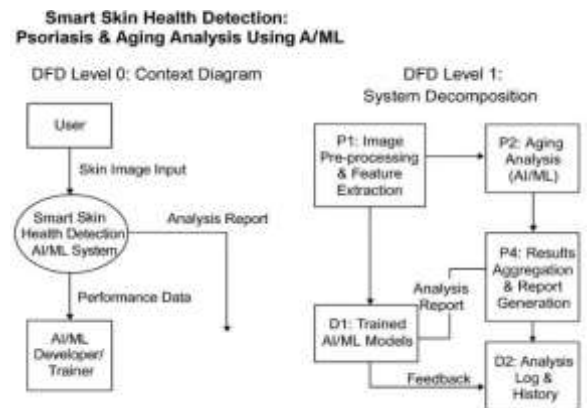


Fig 5.2

The preprocessing stage improves image quality using resizing, normalization, filtering, and contrast enhancement techniques. Feature extraction identifies important skin features such as texture, wrinkles, redness, and scaling. These features are analyzed using CNN models trained on skin image datasets. Finally, the system predicts the skin condition and provides skincare guidance to users.

6. Methodology

The methodology of the proposed system follows a step-by-step process:

Step 1: Data Collection

Skin image datasets related to psoriasis, wrinkles, aging, and dryness are collected from reliable sources such as Kaggle and ISIC Archive.

Step 2: Image Upload

Users upload skin images through the Streamlit-based web application.

Step 3: Image Preprocessing

Uploaded images are resized and normalized. Noise removal and enhancement techniques improve image quality.

Step 4: Feature Extraction

Important skin features such as wrinkles, redness, scaling, texture, and pigmentation are extracted.

Step 5: Model Training

Convolutional Neural Network (CNN) models are trained using labeled skin image datasets.

Step 6: Prediction and Analysis

The trained model predicts psoriasis symptoms and aging conditions with confidence scores.

Step 7: Result Generation

The application displays the prediction results and skincare recommendations.

7. System Architecture

The system architecture integrates frontend, backend, and machine learning modules. The Streamlit frontend provides user interaction and image uploading functionality.

Python-based backend modules perform image preprocessing, feature extraction, and prediction analysis. The CNN model acts as the core prediction engine for classification.

The database module stores uploaded images and previous reports securely. The result

suggestions, and awareness guidance for users.

The architecture ensures scalability, accuracy, and efficient healthcare monitoring support.

8. Results and Discussion

The proposed system was tested using multiple skin image samples under different conditions. Experimental results indicate that the system achieves approximately 80–90% prediction accuracy under normal lighting conditions.

The CNN model successfully identifies psoriasis symptoms, wrinkles, dryness, and pigmentation patterns from uploaded images. Users reported satisfaction with the speed and usability of the Streamlit application. Prediction results were generated within a few seconds, making the system suitable for real-time healthcare support. The recommendation engine also provided personalized skincare products and routines based on detected conditions. However, system performance decreases slightly in poor lighting conditions or when images contain heavy makeup or obstructions. These limitations suggest the need for larger datasets and advanced deep learning techniques for future enhancement.

9. Advantages and Applications

Advantages of the proposed system include:

- I. Early detection of skin diseases.
- II. Fast and accurate image analysis using AI/ML.
- III. Affordable and accessible healthcare support.
- IV. User-friendly interface for general users.
- V. Personalized skincare guidance and awareness.

Applications of the system include:

- i. Dermatology clinics and hospitals.
- ii. Smart healthcare monitoring systems.

- iii. Cosmetic and skincare analysis.
- iv. Remote healthcare applications.
- v. Educational and research purposes.

10. Conclusion and Future Scope

The Smart Skin Health Detection system successfully demonstrates the use of Artificial Intelligence and Machine Learning for healthcare and dermatology applications. The proposed system provides automated psoriasis detection and aging analysis using image processing and CNN-based prediction models. The Streamlit application offers a simple and interactive platform for users to monitor skin health and receive skincare guidance. The system supports early disease detection, awareness, and preventive healthcare. Future enhancements may include live camera integration, multilingual support, cloud-based report generation, mobile applications, and detection of additional skin diseases such as eczema, acne, fungal infections, and skin cancer. Advanced deep learning architectures can also be integrated to improve prediction accuracy and real-time performance.

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