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Human Skin Disease Detection

MANOJ KUMAR N
Department of CSE
VTU University
Belagavi, India
manojkumarnm65@gmail.com

MEGHA M
Department of CSE
VTU University
Belagavi, India
meghahugar154@gmail.com

MUTHAMMA P M
Department of CSE
VTU University
Belagavi, India
muthammapm72@gmail.com

PRUTHVI V
Department of CSE
VTU University
Belagavi, India
Pvanikeri@gmail.com

Guide : Dr. M Gopal

HOD AIML department VTU University Belagavi,India

mallegopal0288@gmail.com

Abstract—

Skin diseases are common health conditions that affect people worldwide. Early detection and accurate classification of skin diseases are important for supporting timely medical treatment. However, identifying skin diseases through visual examination can be challenging because different skin conditions may have similar visual characteristics. Recent advancements in artificial intelligence and deep learning have created opportunities to develop computer-aided systems for medical image analysis.

This research focuses on human skin disease detection using deep learning techniques. The proposed approach uses skin images as input and applies image preprocessing techniques to prepare the images for classification. Convolutional Neural Networks (CNNs) can automatically extract important features such as colour, texture, and lesion patterns. Residual Networks (ResNet) can also be used to learn complex image features through their residual connections, supporting the classification of different skin conditions. The system aims to identify patterns in skin images and classify them into predefined disease categories based on the training data.
The performance of the proposed approach can be assessed using evaluation metrics such as accuracy, precision, recall, and F1-score.

This research explores the potential of deep learning to support preliminary skin disease screening and improve the efficiency of image-based analysis. The system is intended to assist healthcare professionals and is not a replacement for professional medical diagnosis
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Keywords— Keywords: Human Skin Disease Detection, Deep Learning, Convolutional Neural Network (CNN), ResNet, Image Processing, Skin Lesion Classification, Melanoma Detection, Medical Image Analysis, Transfer Learning, Artificial Intelligence.

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I. INTRODUCTION

Skin diseases are common health problems that affect people of different ages. They may be caused by infections, bacteria, fungi, viruses, allergies, or other medical conditions. Some skin diseases are mild, while others, such as melanoma, can become serious if they are not identified and treated early. Therefore, early detection and accurate classification of skin diseases are important for improving healthcare and supporting timely medical decisions.

Traditional skin disease diagnosis mainly depends on visual examination by dermatologists and, when necessary, additional medical tests. However, identifying skin diseases from images can be challenging because different diseases may have similar visual characteristics. The accuracy of diagnosis may also depend on the experience of the medical professional, image quality, and the stage of the disease. These challenges have encouraged researchers to explore computer-aided diagnosis systems that can assist in skin disease identification.

Deep learning has become an important technology in medical image analysis. Convolutional Neural Networks (CNNs) can automatically learn useful features from skin images, such as colour, texture, shape, and lesion patterns. Residual Networks (ResNet) improve deep neural network training through skip connections, which help information and gradients flow through multiple layers. These capabilities make CNN- and ResNet-based models useful approaches for investigating automated skin lesion classification.

This research focuses on developing a deep learning-based approach for human skin disease detection using skin images. The proposed approach involves image collection, preprocessing, model training, and classification. Image preprocessing helps prepare the input images for analysis, while the trained model learns patterns associated with different skin conditions. The performance of the system can be evaluated using metrics such as accuracy, precision, recall, and F1-score, provided that suitable test data and ground-truth labels are available.

The main aim of this research is to investigate how deep learning can support the automated classification of skin diseases and contribute to the development of computer-aided diagnostic.

II .LITERATURE REVIEW

1. Brinker et al. (2018) – Skin Cancer Classification Using Convolutional Neural Networks

The authors reviewed research on using Convolutional Neural Networks (CNNs) for skin cancer classification. The study discussed how deep learning models can automatically learn features from skin lesion images and classify different types of skin cancer. The review highlighted the potential of CNNs for computer-aided diagnosis. However, differences in datasets and experimental methods make it difficult to compare the performance of different models fairly.

2. Kassem et al. (2021) – Machine Learning and Deep Learning Methods for Skin Lesion Classification and Diagnosis

The researchers reviewed traditional machine learning and deep learning approaches for skin lesion classification. The study examined different techniques, their contributions, and their reported performance. It showed the importance of automated image analysis in supporting skin disease diagnosis. However, the effectiveness of these methods depends on the quality of the dataset, the selected model, and the evaluation procedure.

3. Yang et al. (2023) – A Survey, Review, and Future Trends of Skin Lesion Segmentation and Classification

The authors reviewed research on skin lesion segmentation and classification, covering 594 publications from 2011 to 2022. The study examined datasets, preprocessing, data augmentation, model architectures, training techniques, and evaluation metrics. It highlighted the importance of selecting suitable datasets and preprocessing methods. The study also discussed challenges related to limited datasets and reliable performance evaluation.

4. Skin Lesion Classification and Detection Using Machine Learning Techniques: A Systematic Review (2023)

This study reviewed machine learning and deep learning methods for skin lesion classification, segmentation, and detection. It discussed conventional machine learning algorithms, CNN-based methods.



III. METHODOLOGY

The proposed Human Skin Disease Detection System follows a deep learning-based approach that integrates image preprocessing, feature extraction, model training, skin disease classification, and performance evaluation.

The system is designed to analyze skin images, identify visual patterns associated with different skin conditions, and classify the images into predefined disease categories. It follows a structured workflow in which the input images are processed before being supplied to a trained deep learning model.

The integration of these components provides an automated platform for skin image analysis and preliminary disease classification.The methodology begins with dataset collection and image preprocessing. Skin lesion images are collected from a suitable dataset containing labelled examples of different skin conditions, including melanoma and other selected categories. The images are resized to a consistent resolution and normalized to ensure compatibility with the selected deep learning model. Data augmentation techniques, such as rotation and flipping, may be applied to training images to improve model generalization. Image segmentation can also be incorporated when required to isolate lesion regions from the surrounding skin and focus the analysis on relevant visual features.

The feature extraction and classification process forms the core of the proposed system. A Convolutional Neural Network (CNN) or Residual Network (ResNet) is used to learn important image characteristics, including colour variations, textures, shapes, and lesion patterns. During training, the model learns relationships between the extracted features and their corresponding disease labels. Once training is completed, the model processes new skin images and predicts the corresponding disease category. potential errors. The resulting system aims to support preliminary skin disease screening; however, its predictions are not a substitute for professional medical diagnosis..

IV. RESULTS AND DISCUSSION

The proposed Human Skin Disease Detection System integrates image preprocessing, deep learning-based classification, and performance evaluation within a single application. The system is designed to analyze skin images, identify patterns associated with different skin conditions, and classify them into predefined disease categories. Since verified experimental results are not yet available, numerical performance values .

1 Home and Login Interface

1.a Home Interface

The home page is the main interface of the Human Skin Disease Detection System, designed with a modern dark blue theme and cyan highlights. It includes a navigation bar with Home, About, Features, Diseases, and Contact options, along with Login and Sign Up buttons for user access. The main section introduces skin disease detection using deep learning and provides information about the system's functionality. Users can upload skin images for automated analysis and receive .



Fig 1.a Home Interface

1.b Login Interface

The login page of the proposed Human Skin Disease Detection System provides a secure and user-friendly interface for registered users to access the application. It follows a dark blue theme with cyan highlights, creating a modern medical technology appearance. The page is divided into two main sections: an information panel on the left and a login form on the right.



Fig 1.b Login interface



Fig.2 Dashboard Interface

2 Dashboard

The dashboard of the proposed Human Skin Disease Detection System provides a centralized interface for users to access the major functionalities of the application. It follows a modern dark-blue theme with cyan highlights, attractive icons, and organized information panels to create a user-friendly experience. The dashboard is designed to help users upload skin images, view disease classification results, access previous predictions, and explore information about common skin conditions. The integration of these features provides a convenient platform for preliminary skin image analysis using deep learning techniques.

The dashboard includes a navigation sidebar containing options such as Dashboard, Upload Image, Prediction History, Diseases Info, Profile, Settings, and Logout. These options allow users to navigate between the different sections of the application. The top navigation area includes a search bar, notification icon, and user profile section, helping users access relevant information and manage their accounts.

The dashboard also displays summary cards representing the total number of predictions, normal results, detected diseases, and registered users. These cards provide a quick overview of the system's recorded activities. The image upload section allows users to select or drag and drop a skin image for analysis. After an image is submitted, the deep learning model.

3 .Upload image Interface

The Upload Image page of the proposed Human Skin Disease Detection System provides an interface for users to upload skin images for analysis and classification. The page follows a dark-blue theme with cyan highlights, offering a modern and user-friendly design. It allows users to select an image from their device or drag and drop it into the designated upload area. The system is designed to process the uploaded image using a trained deep learning model and predict the corresponding skin disease category.

The page consists of an image upload section, image preview panel, prediction result panel, sample images, and guidelines for obtaining better predictions. The upload section supports image formats such as JPG, PNG, and JPEG, subject to the application's configured file-size limits. After an image is selected, the preview panel displays the uploaded image so that users can verify it before analysis.

The prediction result panel displays the predicted skin disease category and, if supported by the model, a confidence score. The interface may also provide a brief description of the predicted condition and options to analyze another image or view additional disease information. Sample images representing conditions such as melanoma, nevus, eczema, psoriasis, and acne help illustrate the types of skin images that the application is designed to process..



Fig.3 Upload image interface



Fig.4 Result Interface

4. Result Interface

The Results page of the proposed Human Skin Disease Detection System presents the classification output generated by the deep learning model after analyzing an uploaded skin image. The interface follows a dark-blue theme with cyan highlights and organized information panels to display the uploaded image, predicted disease category, confidence score, and related information. It is designed to help users understand the model's output through a clear and structured presentation.

The uploaded image section displays the selected skin image along with details such as the image filename, file size, dimensions, and format. The prediction result section presents the predicted skin condition and its associated confidence score. In the illustrated interface, melanoma is shown as the primary prediction, with a confidence score of 92.4%. This value is an illustrative example from the UI mockup and is not a verified experimental result.

The Top 3 Predictions section displays the three highest-ranked predicted categories with their corresponding confidence scores. In the mockup, these categories are melanoma, nevus, and seborrheic keratosis. This feature illustrates how a classification model can present alternative predictions alongside the highest-ranked category. The description panel provides brief information about the predicted condition and emphasizes the importance of early medical evaluation.

V. CONCLUSION

The proposed Human Skin Disease Detection System using Deep Learning aims to provide an automated approach for analyzing skin images and classifying different skin conditions. By integrating image preprocessing, feature extraction, and deep learning-based classification, the system is designed to identify visual patterns associated with skin diseases, including melanoma and other selected skin conditions. The application provides a user-friendly interface for image uploading, prediction result visualization, and access to relevant disease information.

The system demonstrates a structured approach to integrating deep learning techniques into preliminary skin disease screening. The use of CNN or ResNet architectures can help automate feature learning and image classification, while performance evaluation using accuracy, precision, recall, and F1-score can help assess the model's effectiveness. However, the reliability of the system depends on dataset quality, class representation, model selection, and validation procedures. Since verified experimental results are not yet available, the actual classification performance remains to be established.



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