

DERMATRIX-AI APPLICATION FOR SKIN DISEASE DETECTION

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Keywords:

Skin Disease Detection, Artificial Intelligence, Deep Learning, Convolutional Neural Network, Medical Image Classification.

Introduction:

Skin diseases come in all different kinds and affect millions worldwide; they range from minor infections such as acne and eczema to severe conditions like melanoma. Early diagnosis provides the key to preventing complications and improving treatment outcomes. Traditionally, skin disease Clinical diagnosis involves visual screening by trained dermatologists and may prove time-consuming and expensive. In most developing regions, limited access to dermatological expertise is translated into late diagnosis and improper treatment. With the rapid growth in Artificial Intelligence (AI) and with the recent development of deep learning, much attention has been given to automated medical image analysis systems. The CNN models have shown very impressive performance regarding images classification tasks, including medical and dermatological applications. This implementation is targeted at an AI-based skin disease detection system to analyses skin images and predicts the type of disease. This system is aimed at fast correct, economical diagnosis support, increasing accessibility of healthcare and Awareness among users.

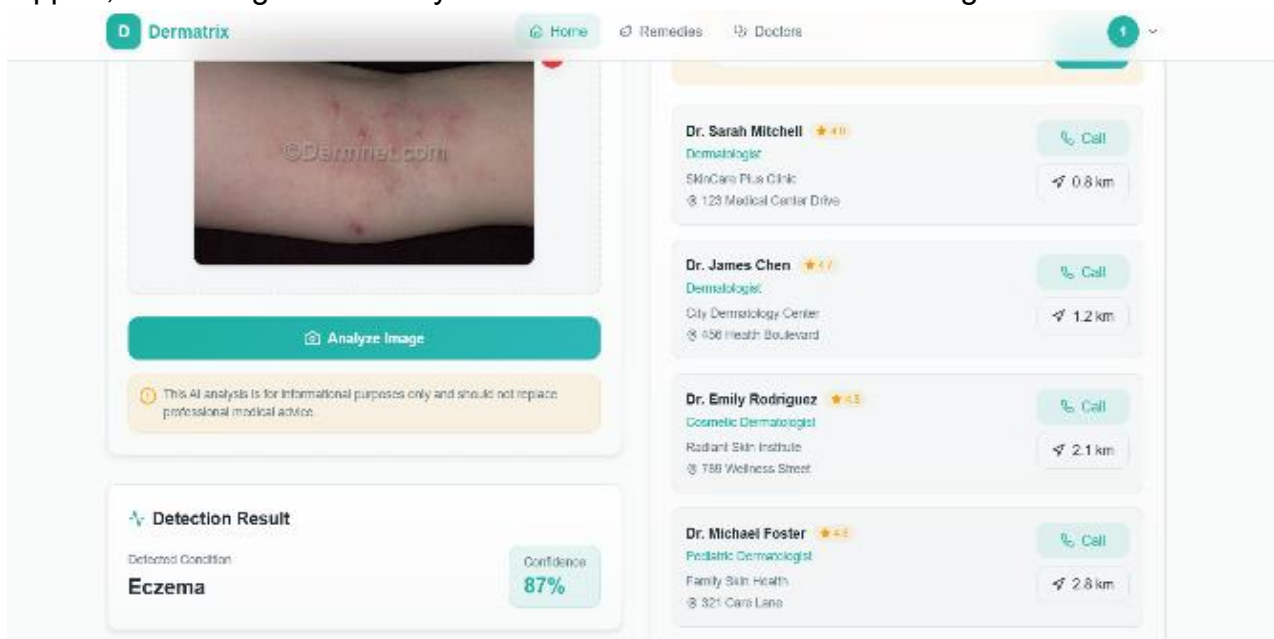


Figure 1: System Output with Remedies & Doctor Suggestions

Objectives:

1. Accurately detect and classify multiple skin diseases from images.
2. Support diverse skin tones and lighting conditions.
3. Provide interpretable diagnosis and recommended actions.
4. Deploy the system on mobile platforms with real-time response.
5. Include a feedback loop to improve the model over time.

Methodology:

The methodology of the *Dermatrix-AI skin disease detection system* involves a structured pipeline that begins with collecting dermatological image datasets followed by preprocessing techniques such as image resizing, normalization, noise removal, and skin-tone balancing to handle variations in real-world inputs. Data augmentation methods including rotation, flipping, zooming, and the fairness-focused EdgeMixup technique are applied to improve model generalization across diverse skin tones. The processed data is then fed into deep learning models using transfer learning with architectures like EfficientNet and MobileNet to perform accurate multi-class disease classification. The trained model is evaluated using metrics such as accuracy, precision, recall, and confusion matrix to ensure reliability. Once deployed, the system accepts user-uploaded images, predicts the skin disease along with confidence scores, and generates Grad-CAM heatmaps to provide visual explainability of the prediction. Finally, a recommendation engine suggests home remedies for mild conditions or advises professional medical consultation for severe cases, and the entire workflow is integrated into a user-friendly web or mobile interface for real-time usage.

Result and Conclusion:

1. The Dermatrix-AI system achieved high accuracy in detecting multiple skin diseases using deep learning models like EfficientNet and MobileNet. It provided fast predictions (around 1–2 seconds) and worked well under different lighting conditions and skin tones. The Grad-CAM feature improved transparency by showing affected areas, and the recommendation system successfully suggested remedies or medical advice.
2. The project successfully demonstrates an AI-based system for early skin disease detection using image analysis. It is accurate, user-friendly, and helps users with proper guidance. While not a replacement for doctors, it serves as an effective early screening tool and can be improved further with more data and features.

Reference:

1. [1] Automatic skin disease diagnosis using deep learning from clinical image and patient information
2. [2] A Method of Skin Disease Detection Using Image Processing and Machine Learning January 2019 [Procedia Computer Science](#)
3. [3] Skin Disease Detection Based On Image Processing Techniques
4. [4] Skin disease detection using deep learning Author links open overlay panel Syed Inthiyaz ^a, Baraa Riyadh Altahan ^b, [Sk Hasane Ahammad](#) ^a, V Rajesh ^a, Ruth Ramya Kalangi ^a, Lassaad K. Smirani ^c

5. [5] Skin Disease Detection Using Image Processing and Machine Learning
Authors: -Assistant Professor Punashri Patil, Prathvish Shetty, Nikhil Shinde, Ashirwad Swami, Sahil Hanwate
6. [6] Deep learning in dermatopathology: applications for skin disease diagnosis and classification.

Future Scope:

The future scope of this project includes:

1. Develop a mobile application for real-time and easy access.
2. Improve model accuracy using larger and diverse datasets.
3. Add more skin diseases and rare conditions for better diagnosis.
4. Integrate online dermatologist consultation (telemedicine).
5. Provide multi-language support for wider user accessibility/