International Journal of Scientific Research in Computer Science, Engineering and Information Technology

ISSN : 2456-3307 OPEN ACCESS

Available Online at : www.ijsrcseit.com

doi : https://doi.org/10.32628/CSEIT24245475

Skin Disease Analysis – Dr. Advice

Asst. Prof. Pavithra, Aarthi A, Aishwarya R, Divya A, Divyapriyadharshini S

Department of Computer Engineering, Sree Sakthi Engineering College, Tamil Nadu, India

ARTICLEINFO

Article History:

Accepted : 01 May 2025

Published: 03 May 2025

Publication Issue

Volume 11, Issue 3

May-June-2025

Page Number

01-07

ABSTRACT

Traditional skin disease diagnosis is often slow, expensive, and requires in-person consultations, making it less accessible for many individuals. Conventional Computer-Aided Diagnosis (CAD) methods rely on manually extracted features like color, texture, and shape, which limits their accuracy, particularly across diverse skin tones. Additionally, online symptom checkers and existing AI models often lack real-time processing capabilities and mobile accessibility, reducing their effectiveness in providing instant and accurate results. To address these limitations, we developed Dr.Advice, an AI-powered Android application designed for real-time skin disease detection. Built with Python, Java, C++, Kotlin, and Android Studio SDK, Dr.Advice integrates advanced machine learning techniques to analyze skin images, detect conditions, and provide diagnostic insights. The application features real-time image processing, a user-friendly interface, and secure data handling, ensuring privacy and accuracy. Trained on diverse datasets, the model enhances detection accuracy across various skin tones. By offering fast, reliable, and accessible early diagnosis, Dr.Advice aims to revolutionize dermatological care, improving treatment outcomes and making skin disease detection more efficient and widely available.

Keywords: — Skin Disease Detection, Artificial Intelligence (AI), Machine Learning (ML) Deep Learning, Computer-Aided Diagnosis (CAD),Android Application, Real-Time Processing, Mobile Accessibility, Image Processing, User-Friendly Interface, Data Security, Neural Ne

Introduction

Early and accurate diagnosis of skin diseases plays a crucial role in effective treatment and patient care. However, traditional dermatological consultations often require in-person visits, which can be time-consuming, expensive, and inaccessible to many, particularly in remote areas. Additionally, existing Computer-Aided Diagnosis (CAD) systems and online symptom checkers rely on predefined features and lack the adaptability to diverse skin tones, reducing their effectiveness.

To overcome these challenges, Dr.Advice is proposed as an AI-powered Android application designed to analyze skin images, detect conditions, and provide diagnostic insights in real-time. By integrating deep learning techniques with mobile accessibility, Dr.Advice enables users to receive instant and accurate skin disease predictions. The application is developed using Python, Java, Kotlin, and Android Studio SDK and is trained on a diverse dataset to ensure inclusive across various skin types.

Dr.Advice incorporates advanced image processing techniques to enhance diagnostic precision. It provides a user-friendly interface, allowing individuals to upload images and receive immediate results. Additionally, secure data handling measures ensure user privacy and confidentiality. By leveraging deep learning and real-time analysis, Dr.Advice enhances accessibility, reduces diagnostic delays, and improves overall dermatological care.

The algorithm will utilize insights from the sketches and the database to identify and suggest related facial features that can be paired with a single selected feature, which will help minimize the time needed and boost the platform's effectiveness.

RELATEDWORK

Significant progress has been made in recent years at the nexus of artificial intelligence and dermatology. In order to help dermatologists, traditional Computer-Aided Diagnosis (CAD) systems have been created to analyze specified features from skin scans. Nevertheless, these methods frequently lack the flexibility to take into consideration different skin tones and differences in image quality, which results in a lower level of diagnostic accuracy in practical situations.

There are several mobile applications and online symptom checkers, however many of them are not very functional and mostly rely on user-reported symptoms instead of direct image analysis. Moreover, deep learning frameworks, which have shown better results in image classification tasks, especially in the field of medical imaging, are usually not integrated with these tools.

Recent research has highlighted the potential of Convolutional Neural Networks (CNNs) for the diagnosis of skin diseases, with encouraging outcomes in the classification of psoriasis, eczema, and melanoma. Nevertheless, a lot of models are trained on datasets that are not diverse, which produces biased results and less generalization across other demographics.

Researchers have started creating AI-powered smartphone apps that can evaluate skin conditions in real time in order to overcome these constraints. To improve prediction accuracy, these applications employ image processing techniques and deep learning models that have been trained on a variety of datasets. Despite advancements, there are still issues with guaranteeing model stability, data privacy, and non-specialist users' usability.

By providing a comprehensive, real-time diagnostic tool that is integrated into an Android application, Dr.Advice expands on this framework. It seeks to democratize dermatological care, particularly for underprivileged and isolated communities, by utilizing deep learning and guaranteeing support for a range of skin tones.

PROBLEMS IDENTIFIED

A. Time-Consuming Diagnosis: Traditional dermatological consultations require appointments, physical visits, and lab tests, leading to delays in diagnosis and treatment.

B. High Costs: The cost of in-person consultations and diagnostic tests makes timely treatment inaccessible for many patients.

C. Limited Accuracy in CAD Systems: Conventional CAD systems rely on manual feature extraction, reducing their effectiveness in detecting skin diseases across diverse skin tones.

D. Lack of Real-Time Processing: Online symptom checkers and existing AI models do not provide immediate results, delaying critical diagnosis.

E. Mobile Inaccessibility: Many existing AI-based models are not optimized for mobile use, restricting access to quick and efficient skin disease detection.

F. Data Security Concerns: Online platforms often do not provide adequate privacy and encryption for sensitive medical data.BackwardCompatibility

LITERATURE REVIEW

1) Traditional Diagnostic Methods

Traditional approaches to diagnosing skin diseases heavily rely on the expertise of dermatologists, involving visual inspection, dermoscopy, and histopathological analysis. Dermatologists typically assess skin lesions based on visual characteristics, using their experience to identify signs of various conditions. While effective, this method is inherently subjective, and accuracy can vary from one practitioner to another. Additionally, it can be time-consuming, leading to delays in diagnosis and treatment.

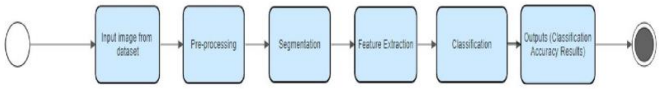
Dermoscopy, a common enhancement technique, uses a dermoscope to magnify skin lesions for better visualization. Although it improves clarity, it still depends significantly on the dermatologist's interpretation. Histopathology **examination**, considered the gold standard, involves taking a biopsy for microscopic analysis. This method provides a definitive diagnosis, especially in ambiguous cases, but is invasive and may take several days to yield results—potentially risky in fast-progressing conditions like melanoma.

2) Machine Learning-Based Approaches

The emergence of machine learning (ML) and deep learning (DL) has transformed dermatological diagnostics. These technologies offer automated, scalable solutions that augment the capabilities of dermatologists and increase accessibility to reliable diagnostic tools.

Convolutional Neural Networks (CNNs), a class of deep learning models, have shown outstanding accuracy in skin disease classification by learning intricate patterns and textures from medical images. When trained on large and diverse datasets, CNNs can outperform human diagnosis in some cases, offering consistent results regardless of human subjectivity.

A major strength of ML models lies in their ability to generalize across various skin types and conditions. This is especially valuable for distinguishing among a wide array of skin diseases, such as melanoma, benign keratosis-like lesions, basal cell carcinoma, actinic keratoses, vascular lesions, and dermatofibroma. By extracting hierarchical features at multiple levels, CNNs can detect subtle differences that may go unnoticed during traditional visual inspection.



However, the success of these models depends heavily on the quality and diversity of the training data. Ensuring datasets represent different skin tones, conditions, and severity levels is critical for broad applicability. Interpretability is another important factor—healthcare providers need to understand how a model arrives at its conclusions. Explainable AI (XAI) techniques help improve clinical trust by highlighting the features that influenced a model's decision.

Despite the progress, challenges remain. Data privacy and security are crucial in medical imaging, requiring strong safeguards to protect patient information and comply with regulations. Addressing these concerns is vital for integrating ML-based systems into clinical environments.

PROPOSED SYSYTEM

The development of the Skin Disease Detection Model is grounded in digital image processing and advanced machine learning algorithms, specifically designed to automate and improve the diagnosis of skin conditions. This multi-stage methodology ensures high-quality data handling, accurate model training, and effective evaluation to support reliable skin disease classification.

Fig 2 input image

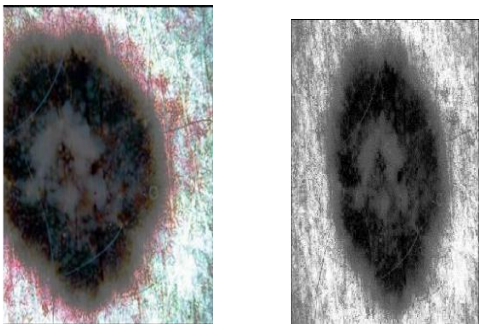


Fig.3. (a) contrast enhancement using histogram (b) grayscale conversion

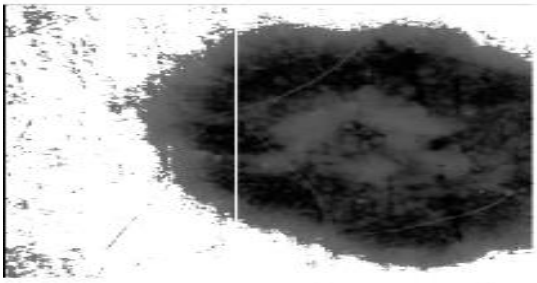


Fig.4. segmentation using global

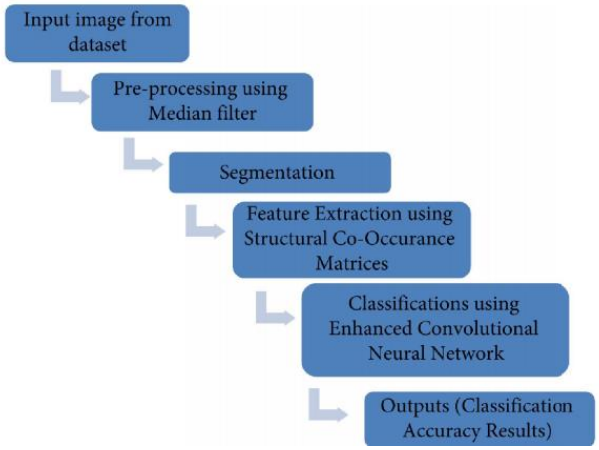


Fig 4.. System Diagram for New Methodology

1. Data Collection and Preparation

The foundation of this approach begins with collecting a diverse and comprehensive dataset of skin disease images. These include conditions such as:

- ✓ Ringworm
- ✓ Scalp Infection
- ✓ Lupus
- ✓ Healthy Skin

Ethical considerations are central to this stage—patient consent, data anonymization, and privacy protection are strictly observed.

Once collected, the images undergo preprocessing, which includes:

- ✓ Resizing to standardized resolutions
- ✓ Noise reduction
- ✓ Contrast enhancement

These techniques ensure consistency and clarity, resulting in a clean dataset optimized for machine learning models.

2. Data Augmentation

To increase the dataset's diversity and robustness, data augmentation techniques are applied. This involves:

- ✓ Rotating
- ✓ Flipping
- ✓ Scaling images

These transformations introduce variability, enabling the model to generalize better across different skin tones, lighting conditions, and lesion presentations. Augmentation significantly improves the model's performance in real-world scenarios.

3. Model Selection and Training

The core of the proposed method lies in the use of Convolutional Neural Networks (CNNs)—a deep learning architecture known for its exceptional capability in image analysis. CNNs can automatically extract and learn hierarchical features such as textures, edges, and shapes from skin images, which are crucial for accurate classification.

During training:

- ✓ The CNN is fed the preprocessed and augmented images
- ✓ Model parameters are optimized to reduce error

and maximize accuracy

- ✓ The model learns to distinguish between various skin conditions based on learned patterns

4. Classification and Predictive Modeling

Once trained, the CNN model is ready for deployment. When a new image is input, the model analyzes and assigns the most likely skin condition label. Its ability to classify multiple skin conditions—ringworm, scalp infection, lupus, and healthy—accurately demonstrates the effectiveness of this approach.

The model is further enhanced with predictive modeling techniques, such as linear regression, to forecast certain attributes of a condition. For instance:

- ✓ Predicting lesion growth rate
- ✓ Estimating the probability of disease progression or severity

These predictive insights can aid dermatologists in early intervention, treatment planning, and patient education.

5. Model Evaluation

To ensure reliability, the model undergoes rigorous evaluation using metrics such as:

- ✓ Accuracy
- ✓ Precision
- ✓ Recall
- ✓ F1-score

These metrics assess the model's ability to correctly classify various skin conditions and identify areas for refinement.

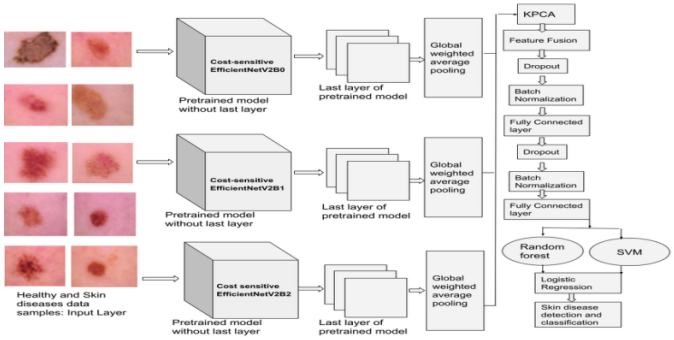


Fig.5. Proposed methodology

RESULT AND EXECUTON::

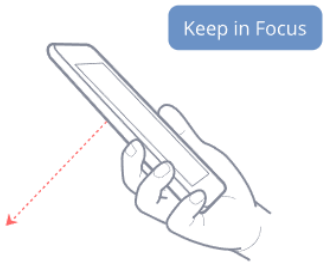


Fig 6. Take a photo

Keep zoomed at the closest distance (less than 10 cm), keep in focus and center only the skin mark (without hair, wrinkles and other objects)

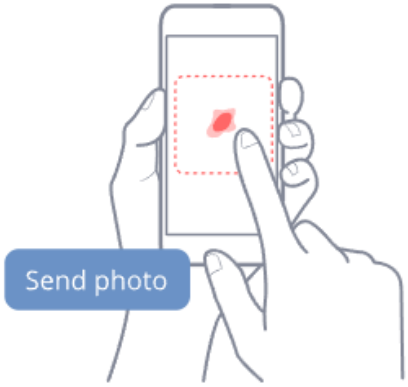


Fig 7. Identify

Snap your photo to the Artificial Intelligence. The system will analyze it and send you a risk assessment.

Fig 8. Receive your risk assessment

Get the result within 60 seconds and related advice on the next steps to take.

Fig 9. Application interface

CONCLUSION:

The Dr.Advice application presents a significant advancement in AI-powered dermatological analysis. By leveraging deep learning models such as CNNs and GANs, the system provides fast, accurate, and accessible skin disease detection. The transition from manual diagnosis to an automated, mobile-based solution addresses key challenges such as limited accessibility, high costs, and data privacy concerns.

Through real-time image processing, secure data handling, and on-device AI inference, Dr.Advice ensures that users receive instant, reliable diagnoses without dependency on dermatologists for preliminary assessments. The integration of mobile technology makes it an ideal tool for underserved communities, improving healthcare outcomes worldwide.

While the proposed system significantly enhances accuracy and efficiency, ongoing improvements—such as refining model generalization across diverse skin tones and expanding the training dataset—will further optimize the solution. Ultimately, Dr.Advice stands as a cost-effective, user-friendly, and privacy-focused application that democratizes dermatological healthcare through AI innovation

References

[1]. Keshetti Sreekala, N. Rajkumar, R. Sugumar, K. V. Daya Sagar, R. Shobarani, K. Parthiban Krishnamoorthy, A. K. Saini, H. Palivela, A. Yeshitla, "Skin Diseases Classification Using Hybrid AI Based Localization

[2]. Approach", Computational Intelligence and Neuroscience, vol. 2022, Article ID 6138490, 7 pages, 2022. https://doi.org/10.1155/2022/6138490.

[3]. M. Malciu, M. Lupu, and V. M. Voiculescu, “Artificial intelligence-based approaches to reflectance confocal microscopy image analysis in Dermatology,” Journal of Clinical Medicine, vol. 11, no. 2, p. 429, 2022.

[4]. M. A. Khan, M. Sharif, T. Akram, R. Damaševičius, and R. Maskeliūnas, “Skin lesion segmentation and multiclass classification using deep learning features and improved moth flame optimization,” Diagnostics, vol. 11, no. 5, p. 811, 2021.

[5]. P. Thapar, M. Rakhra, G. Cazzato, and M. S. Hossain, “A novel hybrid deep learning approach for skin lesion segmentation and classification,” Journal of Healthcare Engineering, vol. 2022, Article ID 1709842, 21 pages, 2022.

[6]. Fawaz Waselallah Alsaade, Theyazn H. H. Aldhyani, Mosleh Hmoud Al-Adhaileh, "Developing a Recognition System for Diagnosing Melanoma Skin Lesions Using Artificial Intelligence Algorithms", Computational and Mathematical Methods in Medicine, vol. 2021, Article ID 9998379, 20 pages, 2021. https://doi.org/10.1155/2021/9998379.

[7]. Mehak Arshad, Muhammad Attique Khan, Usman Tariq, Ammar Armghan, Fayadh Alenezi, Muhammad Younus Javed, Shabnam Mohamed Aslam, Seifedine Kadry, "A Computer-Aided Diagnosis System Using Deep Learning for Multiclass Skin Lesion Classification", Computational Intelligence and Neuroscience, vol. 2021, Article ID 9619079, 15

pages, 2021. https://doi.org/10.1155/2021/9619079.

[8]. Li-sheng Wei, Quan Gan, Tao Ji, "Skin Disease Recognition Method Based on Image Color and Texture Features", Computational and Mathematical Methods in Medicine, vol. 2018, Article ID 8145713, 10 pages, 2018. https://doi.org/10.1155/2018/8145713.022

[9]. S. R, M. Suhil, and D. S. Guru 2015 Segmentation and Classifications of Skin Lesions for Disease Diagnosis International Conference on Advanced Computing Technologies and Applications (ICACTA-2015) Mysore.

[10]. A. K. Mittra and R. Parekh 201 Automated Detection of Skin Diseases Using Texture Features International Journal of Engginering Science and Technology (IJEST) vol. 3, pp. 4801- 4808 .

[11]. Hartatik 2017 Naïve Bayes Approach For Design Of Expert System For Identification Of Children Leather Based On Android IOP Conference Series: Materials Science and Engineering Vol. 333.

[12]. Zainudin, M., Erna Zuny Astuti 2017 Application of the Naive Bayes Algorithm For Classifying the Feasibility of Prospective Customers Pt.Bni Semarang Insurance. Article Thesis Dian Nuswantoro University.

[13]. A. Madsen 2010 Bayesian Networks for Disease Diagnosis B. Thomas Golisano College of Computing and Information Sciences.

[14]. M Z Asghar , M J Asghar , S M Saqib , B Ahmad , S Ahmad and H Ahmad 2011 Diagnosis of Skin Diseases using Online Expert System (IJCSIS) International Journal of Computer Science and Information Security, Vol. 9, No. 6.

[15]. Kusrini 2007 Concept and Application of Decision Support Systems Andi publisher Yogyakarta. [8] Hustinawaty and R Aprianggi 2014 The Development of Web Based Expert System for Diagnosing Children Diseases Using PHP and MySQL International Journal of Computer Trends and Technology (IJCTT) – Vol 10 number 4 – Apr 2014.

[16]. N. Arbaiy and S. T. Chong 2012 Android mobile application for medical diagnosis expert system: a knowledge dissemination tool Proc. 1 st International Conference on Mobile Learning, Applications, and Services pp. 31-35

[17]. N Fitri, Yoga, H. A and Endah, N. Y 2016 Expert Application for Diagnosis Skin Disease Using the Forward Chaining Method Al Arif Skin Care of Ciamis Regency.

[18]. Durkin. J. 1994.Expert System Design and Development, Prentice Hall International Inc, New Jersey. United States: McGraw Hill Professional