Derma Scan – Skin Disease Detection Using AI in Android

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Abstract: Skin diseases are widespread and require timely detection to prevent complications. However, access to dermatological care is limited in many regions, leading to delayed diagnosis and treatment. Derma-Scan is an AI-powered Android application designed to provide users with fast and reliable preliminary skin disease detection using smartphone-captured images. The system integrates a deep learning-based Convolutional Neural Network (CNN) model optimized with TensorFlow Lite to analyse skin images and predict potential diseases with high accuracy. The application offers an intuitive interface, real-time prediction, secure data handling, and a history feature for tracking user reports. Derma-Scan aims to support early screening, increase accessibility to dermatological insights, and assist users in making informed decisions regarding further medical consultation. This project demonstrates the potential of mobile AI solutions in healthcare, particularly in resource-constrained environments.

Keywords: Skin Disease Detection, Artificial Intelligence, CNN, TensorFlow Lite, Android Application, Medical Imaging, Dermatology, Deep Learning.

I. INTRODUCTION

The field of dermatology plays a critical role in identifying and treating a wide range of skin-related conditions, which, if left undiagnosed, can lead to severe health complications. With the rapid increase in skin diseases caused by environmental changes, lifestyle factors, and genetic predispositions, early detection has become essential. However, access to dermatologists is limited, especially in rural and underserved regions, creating a significant barrier to timely diagnosis and treatment.

The emergence of Artificial Intelligence (AI) and mobile technology offers innovative solutions to bridge this gap. Derma-Scan is an Android-based AI application designed to perform preliminary skin disease detection using deep learning techniques. By simply capturing an image of the affected area, users receive instant, reliable, and data-driven insights about potential skin conditions. Derma-Scan leverages mobile-optimized machine learning models, particularly Convolutional Neural Networks (CNNs) integrated with TensorFlow Lite, enabling high-accuracy predictions directly on a smartphone.

Derma-Scan aims to serve as an assistive diagnostic tool, providing users with accessible dermatological screening, reducing delays in seeking professional medical care, and supporting healthcare services in resource-limited settings. While the application does not replace expert medical diagnosis, it acts as an intelligent decision-support system that empowers users with actionable information.

Derma-Scan is an AI-powered mobile application capable of detecting various skin diseases from images captured through a smartphone camera. The system integrates deep learning, image processing, and mobile computing to provide fast, accurate, and user-friendly predictions. The application allows users to store past predictions, view disease insights, and understand the severity of detected conditions.

The Derma-Scan application operates by acquiring a skin lesion image, pre-processing it, and feeding it into a trained CNN model. The model—converted into a TensorFlow Lite format for mobile deployment—classifies the image into predefined skin disease categories. The user then receives a prediction score, details about the disease, and further recommendations. Additionally, the app maintains a secure history of previous scans

Many patients lack access to specialized dermatological services, resulting in delayed diagnosis and worsening of skin conditions. Manual diagnosis requires expert evaluation, high costs, and physical consultations. There is a need for a portable, automated, and reliable system capable of detecting skin diseases instantly using commonly available smartphones.

II.   RELATED WORK

1. R. Kasmi and K. Mokrani (2016)- Classification of malignant melanoma and benign skin lesions: This study presents one of the earlier automated systems for distinguishing malignant melanoma from benign skin lesions using classical machine-learning techniques. The authors employed image pre-processing, feature extraction (color, texture, and shape), and classification using traditional algorithms. Although the system demonstrated acceptable classification accuracy, its performance was limited by handcrafted features and sensitivity to image variations. This work laid the foundation for later deep learning–based approaches by highlighting the importance of automated skin lesion analysis.

2. Howard et al. (2017)- Mobile Nets: Efficient convolutional neural networks for mobile vision applications: The Mobile Net architecture introduced depth wise separable convolutions to reduce computational cost while maintaining high accuracy. This work is highly relevant to mobile applications, as Mobile Net models are optimized for low-power and real-time environments. Many Android-based skin disease detection systems adopt Mobile Net variants due to their efficiency and compatibility with TensorFlow Lite.

3. Tschandl et al. (2018)- The HAM10000 dataset: A large collection of multi-source dermaroscopic images: This paper introduced the HAM10000 dataset, which contains over 10,000 dermatoscopic images across seven skin disease categories. The dataset is widely used for training and benchmarking deep learning models. Its diversity and size make it a valuable resource, although challenges such as class imbalance remain.

III.   LITERATURE SURVEY

Mobile dermatology applications aim to provide accessible, low-cost, preliminary screening of skin conditions using consumer-grade cameras and on-device or cloud-assisted AI. The literature spans three tightly-coupled areas: (a) classical and deep-learning approaches to lesion detection/classification, (b) datasets and benchmarking resources enabling model development, and (c) engineering and human-factors work required to deploy models on mobile platforms (latency, privacy, UX, and regulatory concerns). This survey summarizes representative studies in each area and highlights gaps relevant to an Android-centered implementation such as Derma Scan.

Early automated dermatology systems relied on handcrafted features and classical classifiers (texture, color, shape features with SVMs or ensemble learners). Kasmi & Mokrani demonstrated such pipelines for melanoma vs benign classification, showing feasibility but limited robustness to image variation.Comparative studies later confirmed the limitations of purely hand-crafted feature pipelines, particularly on heterogeneous, real-world camera image. The field shifted decisively to deep convolutional neural networks (CNNs) after landmark work showing dermatologist-level performance on large clinical image sets [3][3][3]. Subsequent challenge-driven work (ISIC) and ensemble methods further improved detection rates by standardizing evaluation and encouraging best practices [4][4][4]. For mobile systems, these findings motivate using transfer learning and modern CNN backbones fine-tuned on dermatology datasets rather than relying on handcrafted features.

Robust training and fair benchmarking depend on large, well-annotated image corpora. HAM10000 provides a multi-source dermatoscopic dataset of >10k images across multiple diagnostic classes and is widely used for training and validation [9][9][9]. The ISIC Archive serves as a central repository with labeled dermatoscopic and clinical images and hosts annual challenges that drive method comparisons [10][10][10]. These datasets enabled the community to compare architectures (single models and ensembles) and to expose dataset biases (class imbalance, over-representation of lighter skin tones in some collections), which affect generalization to smartphone-acquired photos.Implication for Derma Scan: train/validate on both dermatoscopic datasets (ISIC/HAM10000) and a supplementary set of smartphone-captured images (or use domain adaptation) to reduce domain shift between clinical dermatoscopic images and user-captured photographs.

Two-stage approaches—segment first, classify second—are common because accurate localization reduces background noise and helps the classifier focus on lesion features. U-Net established a strong baseline for biomedical segmentation and is widely used for lesion masks [6][6][6]. Improved variants that incorporate attention mechanisms (Attention U-Net) further improve lesion delineation under challenging imaging conditions (complex backgrounds, variable lighting) [7][7][7]. Studies show that segmentation preceding classification raises per-lesion accuracy and robustness, especially when images include substantial non-lesion context.For mobile deployment, segmentation incurs extra compute and memory cost; model compression and quantization are therefore important so segmentation remains feasible on-device [8][8][8].

MobileNet and its successors introduced efficient convolutional blocks (depthwise separable convolutions) that dramatically lower FLOPs and parameter counts while retaining competitive accuracy [5][5][5]. These architectures—often combined with transfer learning—are natural candidates for Android deployment. TensorFlow Lite provides the conversion, quantization, and runtime support necessary for running CNNs on-device with reasonable latency and battery impact [8][8][8].Derma Scan design choice: adopt MobileNet/V2/V3 variants (or EfficientNet-Lite) for on-device classification; reserve larger backbones for server-side ensemble scoring when connectivity and privacy trade-offs permit.

Several academic and community projects have produced end-to-end Android demos that integrate model inference (TFLite), camera capture (CameraX/Camera2), and simple UX for guided image capture [11][11][11]. These implementations illustrate practical engineering challenges: ensuring consistent framing and lighting, providing realtime feedback to users during capture, handling background uploads, and managing model updates. They also reveal common trade-offs between on-device privacy/latency and cloud-based performance/ensemble modeling.Recommendation for Derma Scan: implement CameraX for consistent APIs across devices, provide in-app guidance (distance markers, autofocus/torch suggestions), and implement optional cloud-assisted secondary analysis for ambiguous or high-risk cases.

IV. PROPOSED SYSTEM

The proposed system, **Derma Scan**, is an Android-based intelligent application designed to assist in the preliminary detection of common skin diseases using Artificial Intelligence. The system leverages deep learning models to analyse skin images captured via a smartphone camera and provides probable disease predictions. The objective is to offer a fast, user-friendly, and privacy-preserving screening tool that operates primarily on-device and can optionally use cloud support for enhanced accuracy.

The user captures a skin image using the Android device camera. The application enforces guidelines such as proper lighting, focus, and distance to ensure high-quality input. Captured images undergo resizing, noise reduction, contrast enhancement, and normalization before being passed to the AI models. These steps reduce variability caused by illumination and background differences.

To isolate the affected skin region, the system employs a deep learning–based segmentation model inspired by **U-Net**. The segmentation module separates the lesion from surrounding healthy skin and background. Attention mechanisms may be incorporated to improve boundary detection. This stage significantly improves classification accuracy by ensuring the model focuses only on the relevant lesion area.

The segmented lesion image is forwarded to a CNN-based classifier. Lightweight architectures such as **Mobile Net** are used due to their efficiency on mobile devices. The classifier is trained on benchmark datasets such as ISIC and HAM10000 and is capable of predicting multiple skin disease categories, including acne, eczema, psoriasis, fungal infections, and melanoma (risk indication).
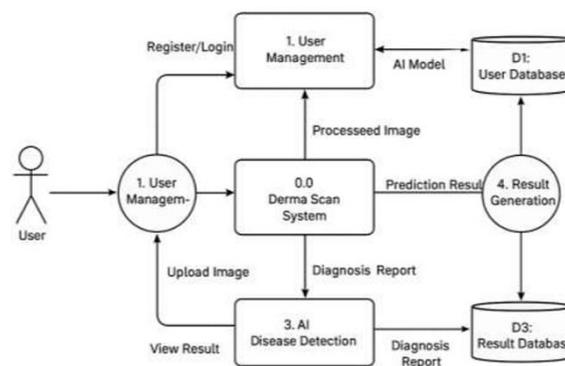

Fig No.1 Architecture of System

Derma Scan prioritizes user privacy by performing inference on-device and avoiding unnecessary cloud uploads. When cloud support is enabled, all data is encrypted and anonymized. The application clearly states that the results are **assistive and not a medical diagnosis**, encouraging users to consult dermatologists for confirmation. Although effective, the proposed system may be affected by poor image quality and limited dataset diversity. Future enhancements include expanding training datasets, supporting more disease categories, integrating dermatologist feedback, and improving explain ability using advanced visualization techniques.

The proposed Derma Scan system combines deep learning, mobile computing, and healthcare intelligence to provide an efficient and accessible skin disease screening solution. By integrating lesion segmentation, lightweight CNN-based classification, and TensorFlow Lite–based on-device inference, the system achieves a balance between accuracy, performance, and user privacy, making it suitable for real-world Android deployment.
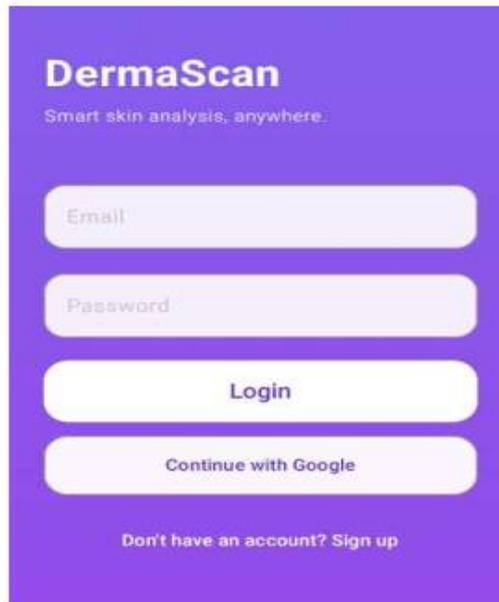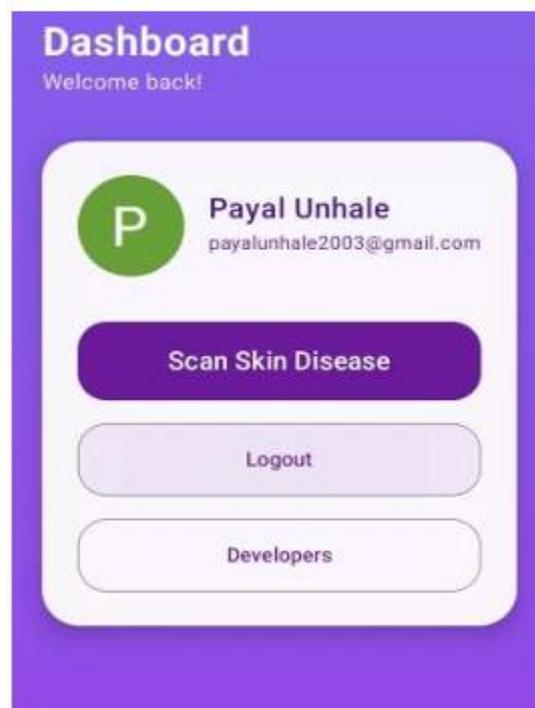
V.   RESULTS
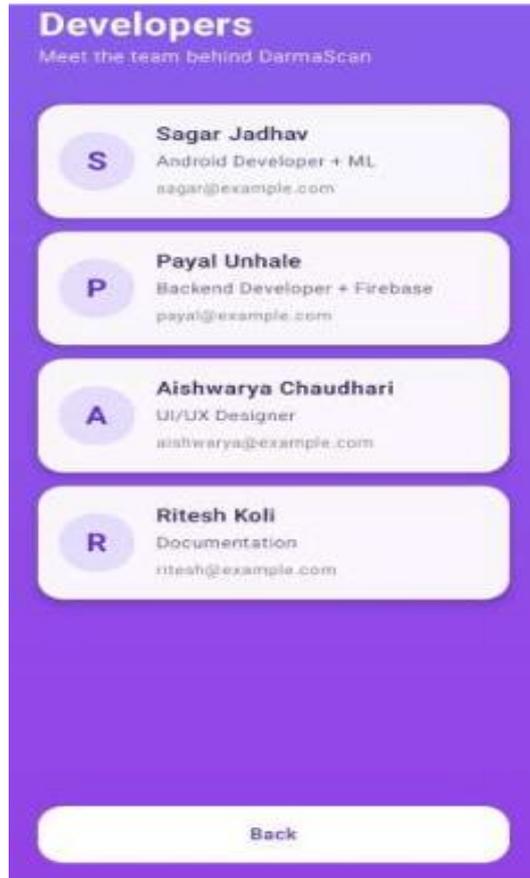

Fig No.2 Login Screen
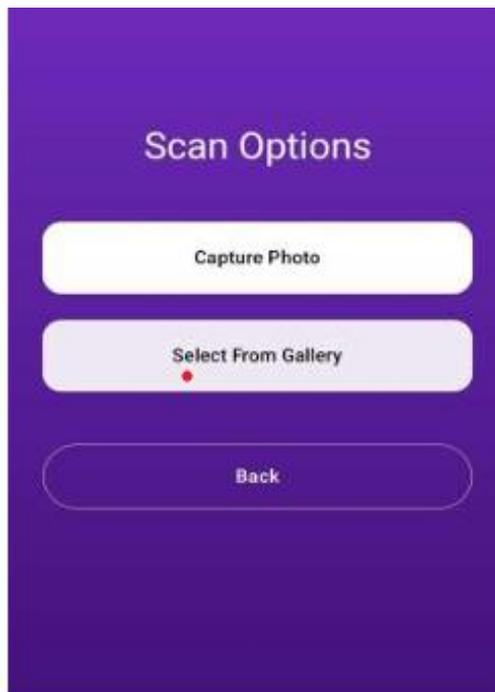

FIG NO.3 USER INFORMATION

FIG No.4 DEVELOPERS TEAM

FIG NO.5 SCAN OPTIONS

VI. CONCLUSION & FUTURE

The development of Derma-Scan – Skin Disease Detection Using AI in Android successfully demonstrates how artificial intelligence, deep learning, and mobile technologies can be integrated to support early identification of common skin diseases. The project achieves its primary objective of offering a fast, user-friendly, and accessible tool that assists individuals in checking possible skin conditions using only their mobile device camera. The development of Derma-Scan – Skin Disease Detection Using AI in Android successfully demonstrates how artificial intelligence, deep learning, and mobile technologies can be integrated to support early identification of common skin diseases. The project achieves its primary objective of offering a fast, user-friendly, and accessible tool that assists individuals in checking possible skin conditions using only their mobile device camera.

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[10]. (Dataset/Challenge background) International Skin Imaging Collaboration (ISIC) public image archives and yearly challenges — key public dataset(s) for training/testing skin lesion classifiers (see ISIC challenge summary above)