IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

E-Derma Real-Time Facial Skin Analysis and Personalized Skin Care

[1]**Meghana H M**, Student (MCA),Department of Masters Of Application,

[2]**Mrs. Reshma H Husennaik**, Assistant Professor, Department of Masters Of Application ,

[1]Department of Masters Of Application,

[1]Administrative Management College, Bangalore, INDIA

Abstract: E-Derma is a website that helps people with skin issues. It uses computers and other new technologies to make it easier for people to get help with their skin. The E-Derma system fixes some issues with skin doctors, such as how hard it is to get an appointment, how much it costs, and how far away it is, especially for people who live in the country or in small towns. People can snap pictures of their faces. The E-Derma system will look at the pictures you upload and tell you what kind of skin you have and what might be wrong with it. The E-Derma system uses computer programs, like Google Gemini AI, to figure out what's going on in the pictures and make smart choices. It can do this quickly and safely. The E-Derma system is safe to use. Can save pictures and information in a way that is simple to use. The E-Derma system isn't meant to take the place of a doctor, but it can help people take care of their skin. The E-Derma system is fair, keeps information safe, and is easy to use. The E-Derma system is meant to help people learn about their skin and how to care for it. The E-Derma system is a good place to start for people who want to take care of their skin, and it can help things get better in the future.

Keywords: Artificial Intelligence, Computer Vision, Machine Learning, Dermatological Analysis, Skin Assessment, ONNX, Gemini AI, Ethical AI, Web-Based Healthcare.

I. INTRODUCTION

E-Derma is a website that uses AI to quickly show you how healthy your skin is. It gets rid of problems like not being able to see a skin doctor, high consultation costs, and problems with getting to the doctor, especially in villages and towns. The system uses pictures of people's faces that users upload to find skin problems, figure out what type of skin they have, and rate how bad they are. It uses a mix of AI methods, such as lightweight models for analysis and more advanced AI models like Google Gemini to give you better understanding and personalized insights. E-Derma makes sure the site is safe, easy to use, and ethical by protecting your data, checking your input, and making its usage policies clear. The System doesn't just look at your skin; it also gives you smart suggestions, skin care tips, and ways to find a dermatologist. This makes it a full support tool that can be used instead of a medical diagnosis. In general, E-Derma shows how AI can be used in a moral way in the medical field. Adding integration and tele-dermatology support in the future will make it better. E-Derma uses AI to show you how healthy your skin is in real time, and the site is safe, easy to use, and moral. People could use E-Derma to help them take care of their skin.

II. LITERATURE SURVEY

Recent improvements in computer vision and artificial intelligence have made automated dermatological analysis systems much better. OpenCV [2] and NumPy [3] are two examples of image processing libraries and numerical computation frameworks that are commonly used to extract and analyze skin features like texture, color distribution, and patterns. These tools make it easy to pre-process and extract features from facial images. More and more modern web-based healthcare apps are being built with scalable backend frameworks like FastAPI [1]. These frameworks make it easy to develop APIs and process requests asynchronously. SQLite [4] and other database management systems are often used for storing small amounts of data. They make it easy to securely and systematically handle user information and analysis results. Also, RESTful API design principles [10] make sure that system components can talk to each other without any problems, which makes the system work better and easier to maintain. Recent advancements in AI have led to the emergence of sophisticated generative models and extensive language models, exemplified by Google Gemini [7], which improve system interpretability by producing context-sensitive insights and tailored recommendations. Also, integration with services like Google Maps [8] makes it possible to find a dermatologist based on where you are, which makes the system easier to use. Python [9] is the main programming language for the project because it has a lot of libraries and is flexible for AI and web development. The existing literature underscores the necessity of integrating efficient frameworks, scalable architectures, and sophisticated AI models to create intelligent, user-friendly, and secure dermatological assessment systems.

III. RESEARCH METHODOLOGY

The proposed E-Derma system adopts a hybrid Artificial Intelligence and Computer Vision-based methodology to perform real-time facial skin analysis and personalized skincare recommendation. The methodology begins with the acquisition of a facial image through image upload or live capture using the web application. The input image is then preprocessed using OpenCV techniques such as resizing, normalization, noise reduction, and face detection to improve image quality and accurately isolate the facial region. After preprocessing, important skin features including texture, color distribution, brightness, sharpness, acne, pigmentation, redness, and dryness are extracted for analysis. These features are processed using lightweight ONNX-based machine learning models for efficient skin type classification and skin condition detection. To provide more meaningful interpretation and personalized recommendations, the system integrates Google Gemini AI, which generates context-aware skincare guidance based on the detected conditions. A rule-based recommendation engine further suggests suitable skincare products, ingredients, and daily skincare routines according to the user's skin profile and severity level. In addition, the platform recommends nearby dermatologists through Google Maps integration whenever professional consultation is required. The backend securely manages user authentication, image storage, analysis history, and data privacy to ensure reliable and ethical handling of healthcare information. This systematic methodology enables accurate, efficient, secure, and user-friendly preliminary skin assessment while supporting informed skincare decisions rather than replacing professional dermatological diagnosis.

IV. PROPOSED SYSTEM

The proposed system, E-Derma, is an AI-based web application that provides real-time skin analysis and personalized skincare suggestions. Users can upload or capture facial images, and the system quickly analyzes them to detect skin type, conditions, and severity. The results appear in a simple, clear format. The system uses a secure backend for image processing, user authentication, and data storage. It follows a hybrid AI approach; fast local models manage quick tasks, while advanced models like Google Gemini AI offer deeper analysis. E-Derma also features a skincare recommendation system and a tool to find nearby dermatologists. It ensures data security through safe storage and user-controlled data handling. The system acts as a support tool, not a replacement for professional medical advice.The proposed system, E-Derma, is an AI-based web platform that offers real-time analysis of skin conditions and personalized skincare recommendations through image processing and machine learning. Unlike traditional dermatological methods that require in-person visits, this system lets users upload facial images or take live photos for instant analysis. It identifies skin type, detects common skin issues, and assesses severity, displaying the results in a clear and user-friendly format. The system has a modular and scalable design with a secure backend and an interactive frontend interface. The backend manages image processing, user authentication, and data management, ensuring operations are efficient and secure. E-Derma uses a hybrid AI approach; lightweight local models perform quick classification, while more advanced cloud-based models offer deeper analysis and better understanding. Besides analysis, the system features a recommendation engine that gives personalized skincare advice based on identified skin conditions and user characteristics. It also includes a module that helps users find nearby dermatologists and clinics. To promote ethical and secure use, the platform has data protection features like secure storage, input validation, and user-managed data control.

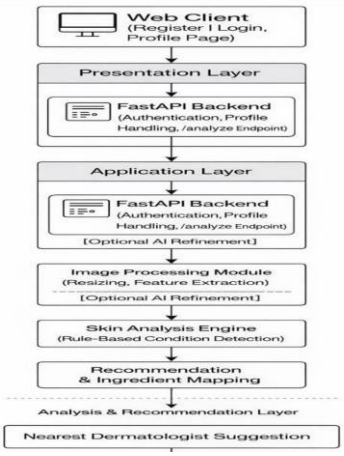

Fig. 1.Methodology of Proposed System

The **E-Derma** system follows a three-tier architecture consisting of frontend, backend, and database layers to ensure scalability, efficiency, and ease of use. The frontend layer provides an interactive user interface that enables image upload or real-time capture and displays analysis results along with personalized skincare recommendations in a structured format. The backend layer acts as the core processing unit, performing image pre-processing, feature extraction, and skin condition classification using AI-based and rule-based techniques. It also communicates with the database to retrieve relevant recommendations and sends processed results back to the frontend. The database layer stores structured data, including condition parameters and recommendation rules, supporting both analysis and decision-making. This modular architecture ensures clear separation of functionalities, allowing easy system updates, integration of new models, and overall scalability.

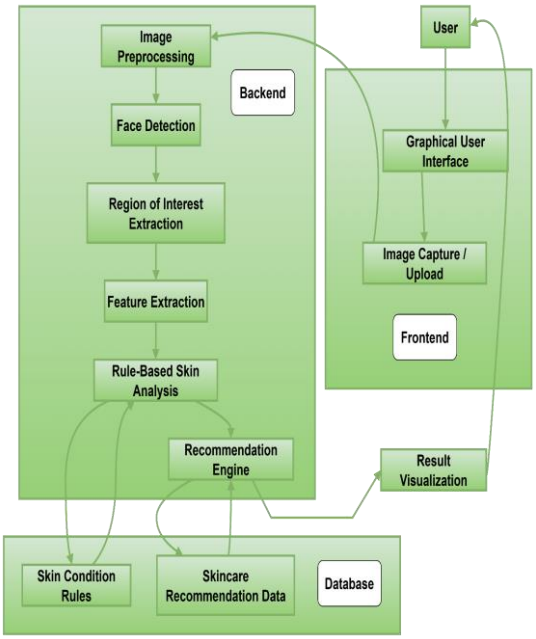

Fig. 2.Architecture of Proposed System

The E-Derma workflow begins with the user uploading or capturing a facial image. The system checks image quality and performs preprocessing such as resizing and normalization. Face detection is applied to extract the facial region, followed by feature extraction to analyze texture and color variations. These features are then classified to identify skin conditions such as acne, dryness, or pigmentation. Based on the results, the system generates personalized skincare recommendations, which are displayed to the user in a clear and structured format.

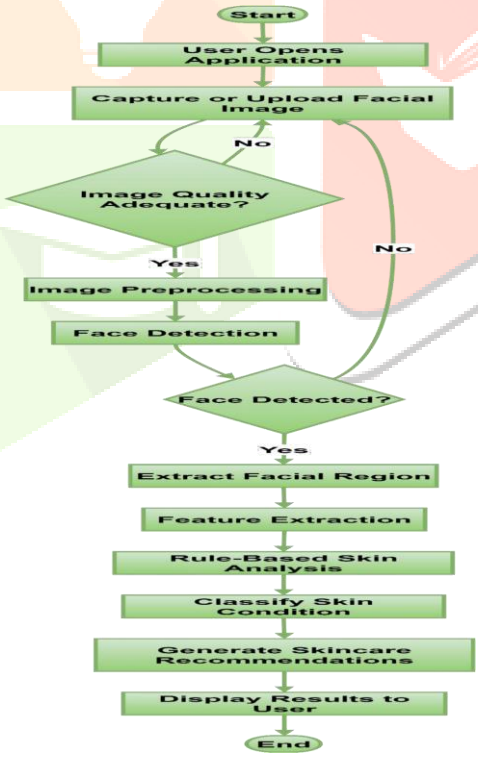

Fig. 3.System Workflow

IV. RESULTS AND DISCUSSION

The E-Derma system successfully analysed the input facial image and identified the skin type as normal. It detected skin issues such as acne, redness, and pigmentation, with a mild severity level. The system also provided confidence scores for each condition and generated personalized skincare recommendations based on the detected issues. The results demonstrate that the system can perform real-time skin analysis and deliver accurate, structured, and user-friendly outputs.

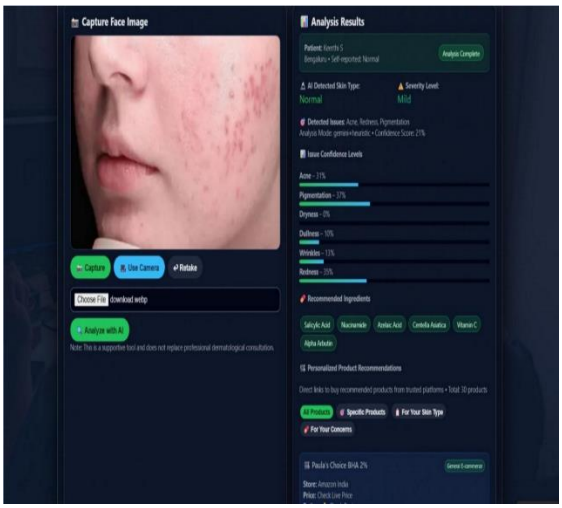

Fig. 4.Analysis Results

The E-Derma system provides both personalized skincare product recommendations and dermatologist suggestions based on the detected skin conditions. The system recommends suitable skincare products and ingredients tailored to the user's skin type and issues. Additionally, it offers a location-based dermatologist suggestion feature, enabling users to find nearby clinics for professional consultation. This combined approach enhances usability by supporting both self-care and expert guidance.

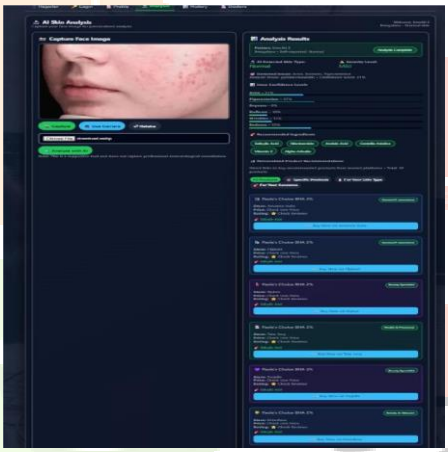

Fig. 5.Products & Dermatologist Suggestion

The experimental results demonstrate that the E-Derma system effectively performs real-time skin analysis by accurately identifying skin type and common dermatological conditions. The system generates structured outputs, including severity levels and confidence scores, along with personalized product recommendations and dermatologist suggestions. The integration of hybrid AI techniques ensures fast processing and meaningful interpretation of results, enhancing both accuracy and usability. Overall, the system proves to be reliable, user-friendly, and practical for preliminary skin assessment, supporting both self-care and professional consultation.

V. CONCLUSION OF ANALYSIS

The E-Derma system demonstrates the effective integration of artificial intelligence and web technologies for real-time skin health assessment. The platform successfully analyzes facial images, detects skin conditions, and provides personalized skincare recommendations in a user-friendly and accessible manner. By addressing limitations of traditional dermatological consultations, the system improves accessibility, reduces dependency on clinical visits, and enhances early awareness of skin health. The hybrid AI approach, along with a modular and secure system design, ensures efficient performance, scalability, and ethical data handling. Overall, E-Derma proves to be a reliable and practical solution for preliminary dermatological analysis, highlighting the potential of AI-driven healthcare applications.

VI. REFERENCES

[1] S. Ramirez and S. Wang, *FastAPI Documentation*, Tiangolo, 2024. [Online]. Available: https://fastapi.tiangolo.com/

[2] OpenCV Developers Team, *OpenCV Library Documentation*, OpenCV, 2024. [Online]. Available: https://docs.opencv.org/

[3] NumPy Community, *NumPy User Guide*, NumPy Foundation, 2024. [Online]. Available: https://numpy.org/doc/

[4] SQLite Consortium, *SQLite Database Engine Documentation*, 2024. [Online]. Available: https://www.sqlite.org/docs.html

[5] Mozilla Developer Network, *HTML Living Standard*, MDN Web Docs, 2024. [Online]. Available: https://developer.mozilla.org/en-US/docs/Web/HTML

[6] Mozilla Developer Network, *JavaScript Guide*, MDN Web Docs, 2024. [Online]. Available: https://developer.mozilla.org/en-US/docs/Web/JavaScript

[7] Google Cloud, *Generative AI and Gemini API Documentation*, Google, 2024. [Online]. Available: https://cloud.google.com/ai/generative-ai/docs

[8] Google Developers, *Google Maps Platform Documentation*, Google, 2024. [Online]. Available: https://developers.google.com/maps/documentation

[9] Python Software Foundation, *Python 3 Documentation*, 2024. [Online]. Available: https://www.python.org/doc/

[10] Lee et al. (2024). Deep learning-based skin care product recommendation using facial skin condition and cosmetic ingredient analysis. Journal of Cosmetic Dermatology, 23(6), 2066–2077.