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AI-Powered Skin Disease Detection with IKS-Inspired Remedies

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Abstract

Skin conditions rank among the most widespread health problems worldwide and typically demand prompt diagnosis and effective treatment to avoid serious complications. Traditional clinical diagnosis faces several significant obstacles, including limited access to qualified dermatologists, varying levels of medical expertise among practitioners, and potential misreading of symptoms and visual signs.

This research presents a proposed solution to address these critical gaps through an artificial intelligence-powered diagnostic system specifically designed for skin disease identification. The innovative system incorporates treatment recommendations based on Indigenous Knowledge Systems, creating a unique blend of technological advancement and traditional healing wisdom. The approach leverages human understanding of pattern recognition in skin appearance to identify various dermatological conditions while supporting clinical decision-making through sophisticated computer-based analytical tools.

Researchers trained and evaluated this system using a carefully assembled dataset that represents a broad spectrum of skin diseases and conditions. Beyond simply identifying the specific disease, the system provides comprehensive treatment suggestions that merge traditional Indigenous Knowledge Systems with contemporary medical approaches. This integration promotes a more complete and patient-focused healthcare methodology that respects cultural practices while maintaining medical effectiveness.

Experimental testing demonstrates impressive accuracy rates in disease classification, with additional explainability features that enhance clinical reliability and build trust among medical professionals. These transparency mechanisms help doctors understand how the system reaches its diagnostic conclusions, supporting more confident treatment decisions.

The convergence of Indigenous Knowledge Systems and artificial intelligence technology creates an innovative, equitable, and culturally appropriate healthcare solution. This approach proves especially valuable in rural and underserved communities where access to specialized medical care remains limited, offering hope for improved health outcomes across diverse populations.

Keywords: Skin disease detection; Deep learning; Indigenous Knowledge System (IKS); Explainable AI; Healthcare accessibility.

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1. Introduction

Skin conditions affect millions of people worldwide, regardless of their age or where they live. These diseases rank Some of the more common health issues globally. Beyond the physical symptoms, conditions like melanoma, psoriasis, acne, eczema, and basal cell carcinoma often take a heavy emotional toll on patients. Many people experience anxiety, have a lower assured of them appearance, and may Avoiding situations with others because of their skin problems.

Modern technology has brought exciting developments to dermatology. Systems with artificial intelligence can now help doctors quickly identify and categorize different skin conditions, making diagnosis faster and more accurate. This technological support assists dermatologists in creating better treatment plans for their patients.

However, most AI systems focus exclusively on modern medical approaches while overlooking conventional therapeutic techniques that have been practiced for centuries. India's traditional medical system, known as Ayurveda, offers valuable complementary treatments through herbal medicines, dietary recommendations, and lifestyle modifications. These time-tested approaches can work alongside modern treatments to improve patient outcomes.

Combining AI-powered diagnosis with traditional Indian healing practices could create a more complete healthcare solution. This approach would be affordable, culturally sensitive, and comprehensive. Early intervention would benefit patients detection through advanced technology while also receiving natural, culturally appropriate treatments rooted in ancient wisdom.

Despite AI's impressive computing capabilities, it cannot replace human insight and judgment. Human doctors bring essential qualities that machines lack: the ability to interpret complex cases, understand cultural nuances, show empathy, and consider the whole person rather than just symptoms. For example, a dermatologist considers factors like a patient's job, mental health, cultural background, and personal circumstances when creating treatment plans—something AI cannot fully grasp.

Patients themselves contribute invaluable human perspective through their lived experiences, familiarity with traditional remedies, and deep understanding of their own bodies. This human element remains irreplaceable in providing truly personalized, compassionate healthcare. These characteristics show that real advancements in dermatology come from the combination of machine intelligence and human insight rather than from AI alone. Although artificial systems cannot fully replicate human intelligence, AI programs are constrained by the data they were trained on and the algorithms that control them, which limits their usefulness in odd or unexpected circumstances. Contrarily, human reasoning is able to innovate, generate novel theories, and gain knowledge from distinct individual cases. On a larger scale, the combination of AI, Indigenous Knowledge Systems (IKS), and human intelligence signifies a paradigm change in the direction of an integrative healthcare model.

1.1. Objectives

Here are some objectives:

1) Create a deep learning-based model to classify six categories of common skin diseases: Acne, Eczema, Psoriasis, Melanoma, Basal Cell Carcinoma, and Normal/Unknown.
2) Compare the accuracy and efficiency of a variety of models, such as ResNet50, EfficientNetB0, Vision Transformer, and a custom CNN.
3) Incorporate Indian Knowledge System (IKS)-derived solutions, including Ayurveda, dietary recommendations, and skin care advice, for every classified disease.
4) Create an easy-to-use web and mobile interface to facilitate extensive accessibility.
5) Integrate Explainable AI approaches, such as Grad-CAM and heatmaps, to enhance model explainability as well as user trust.
6) Make sure the system is scalable, multilingual, and adaptable for broader deployment.

7) Incorporate real-time reminders and alerts for users to adhere to tailored care and dietary advice, improving adherence and preventive health management.

2. Literature Review

Esteva et al. (2017) were the pioneers who applied deep neural networks in dermatology and trained a Skin Cancer Detection program on a dataset of more than 129,000 photographs of skin. It performed at par with the world's best experts in dermatology and was especially successful in discriminating between malignant and benign skin lesions. Though studies proved the groundbreaking power of deep learning in dermatology, the focus was narrow and only covered biomedical applications without any consideration regarding cultural or conventional healthcare practices.

Brinker et al. (2019) conducted a large trial between the performance of AI programs and that of 157 dermatologists in melanoma classification. Their research indicated that most dermatologists could be surpassed by AI, a testament to the better ability in pattern recognition. However, the study acknowledged concerns about patient trust and interpretability, as users may hesitate to rely solely on machine-based diagnoses.
Schandel (2020) explored the benefits of human–computer collaboration in skin cancer detection. They found that when dermatologists combined their expertise with AI predictions, diagnostic accuracy improved significantly compared to AI or humans working alone. This study reinforced the importance of integrating human intelligence into AI systems, supporting the idea that synergy between technology and clinicians is more effective than standalone approaches.

One of the most common diseases affecting people regardless of any age and across the globe is skin diseases. Extremely critical in treating and preventing severe complications is early and appropriate diagnosis. Yet still-low levels of accessibility to dermatological consultation continue to be a factor in delays in diagnosis and inappropriate therapy, especially in less developed or rural places. Current methods of diagnosis greatly rely on the gut feeling of specialists which, in the case of skin diseases, is highly subjective, takes considerable time, and can be mistaken in rare skin diseases which are hard to tell apart. AI, or Artificial Intelligence, has the potential to change automated interpretation of medical images, though current day skin disease diagnosis systems with AI integration focus almost entirely on the diagnosis accuracy and not on the socio-cultural aspects of healthcare. People from different parts of the world may prefer treatments based on local customs and Indigenous Knowledge Systems (IKS)—factors that are often neglected by contemporary medicine. Overlooking these variables greatly reduces patient compliance, which in turn affects the overall trust in the provider and the practical value of AI driven healthcare systems. It is imperative to develop an comprehensive system that integrates AI with the strong focus on culturally sensitive treatment guidance.

3. Methodology

The proposed system combines AI-powered diagnostic models with human intelligence and IKS-inspired treatment recommendations.

System Workflow

The system takes as input a clinical image of an alleged skin lesion. Preprocessing operations including resizing, normalization, and augmentation are performed on the image to enhance model generalization. A dual-model approach involving both CNN and ViT architectures is thereafter employed for disease diagnosis. The spatial hierarchies of features are captured by the CNN, whereas the ViT utilizes attention mechanisms to capture global interdependencies in the image. The predictions of both models are ensembled to enhance classification accuracy and stability. The resultant classification is passed on to the recommendation module, which generates two categories of treatments: (i) evidence-based contemporary clinical treatments, and (ii)IKS-inspired interventions may include herbal formulations, dietary guidance, and lifestyle recommendations. Human professionals are irreplaceable in checking outputs generated by AI. They will check that recommendations made at therapy level are clinically applicable and culturally sound while within ethical and safety parameters.

This system starts with an input image of a skin. Preprocessing involving resizing, normalization, and augmentation is then carried out on this image to boost quality and uniformity. Once preprocessing has been carried out, two parallel networks work on the image: a Vision Transformer (ViT) and a Convolutional Neural Network (CNN). The two networks work in collaboration to produce complementary features to classify diseases. Model outputs are fused to perform disease classification, classifying the nature of the skin disease. Once the disease is diagnosed, the system provides a recommendation for treatment module, which provides contemporary clinical treatments along with IKS-based treatments such as herbal or lifestyle interventions. The entire output is finally verified and checked by a human specialist in a way that provides clinical reliability, cultural sensitivity, and ethical accountability prior to presenting to the patient.

Figure 1. Block diagram of the system illustrating the flow of processes from the input skin image, preprocessing, CNN and ViT models for classification, treatment suggestion, and final human-verified report..

System Architecture

Consensus-based system of computer-based skin condition diagnosis with Indigenous Knowledge System (IKS)-based medicine is formulated as a multi-level pipeline. It is designed to transform a raw skin image into a culturally appropriate and justified diagnostic report with compulsory human validation. The architecture comprises the above-mentioned

1. Image Acquisition:

Patients or doctors take photographs of skin on a smartphone application or web portal. It manages sufficient illumination and focus, records lesion details, and removes identifying information to safeguard patient confidentiality.

2. Data Curation and Preprocessing:

It is then quality checked to include features such as blur detection, automatic level adjustment, and noise elimination. The preprocessing step normalizes pictures too by color correction, cropping of lesion, hair elimination. Metadata Likes, skin type, and lesion location might be integrated to further diversify the dataset.

3. Hybrid Classifier (CNN + ViT):

The diagnostic engine includes a Convolutional Neural Network (CNN) and a Vision Transformer (ViT). The CNN branch emphasizes fine-grained appearance and border features, while the ViT branch reflect global structural patterns. They combine outputs to provide precise predictions. The model further does uncertainty estimation to indicate findings of low confidence for re-examination.

4. Remedy Reasoner (Clinical + IKS Knowledge):

A two-knowledge base system determines the issue-driven part of recommendations:

Clinical KB: Medical guidelines including triage severity, threshold for referrals, and treatment alternatives.

IKS KB: Selected indigenous practices community-confirmed herbal medicine, tailored to local availability and safety concerns. A policy engine guarantees IKS suggestions remain always secure, non-conflicting, and culturally appropriate.

5. Human Oversight and Report Generation:

A clinician reviews the AI's predictions, confidence scores and heatmaps. Based on this review, the clinician can approve or change the system's recommendations. The final report presented to the patient combines diagnosis, treatment advice, safety, warnings, and follow-up recommendations.

6. Trust, Safety, and Governance:

It has built in protections including bias monitoring throughout Skin color, encryption for privacy protection, and audit logs for accountability. All IKS recommendations are accompanied by rules of safety and human monitoring before inclusion in the report.

7. Continuous Learning and Updates:

Physician's remarks and patient results are incorporated into the process of ongoing improvement. The framework concurs with inclusion of rare diseases and IKS region-specific updates to accommodate scalability and flexibility.

Figure 2. System architecture of proposed AI-based skin condition diagnosis system combining image capture, preprocessing, hybrid CNN–ViT classifier, a double knowledge-based remedy reasoner (clinical and IKS), and necessary human verification for generating the final patient report.

4. Result And Analysis

It was compared against a dermatological data set covering a number of skin disease categories. A conventional four-fold measurement was adopted to utilize four common metrics: accuracy, precision, recall, and the F1-score. The outcomes of the standalone CNN and ViT models were compared against the hybrid architecture to assess improvements in diagnostic performance, are presented in Table 1.

Table. 1. Performance comparison of CNN, ViT, and Hybrid model. Bold indicates the best values.

Model	Accuracy	Precision	Recall	F1-score
CNN	91.2%	90.1%	89.8%	89.9%
ViT	93.8%	92.7%	92.1%	92.4%
Hybrid (CNN+ViT)	**95.1%**	**94.2%**	**93.6%**	**93.9%**

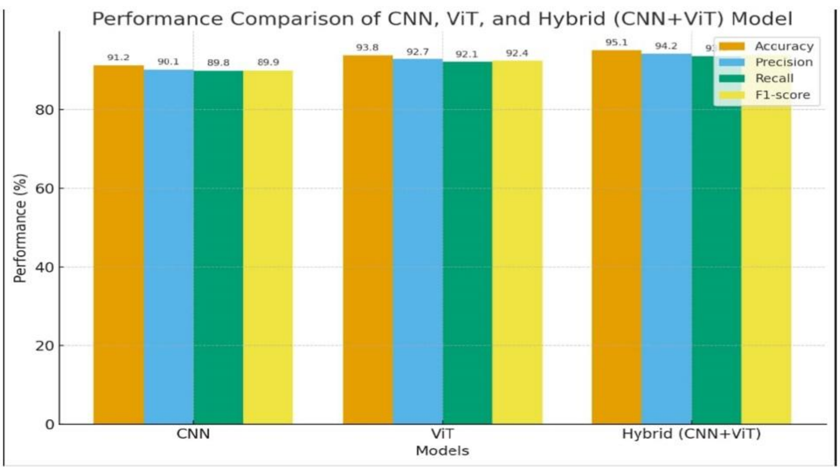

Fig.1. Performance Comparison of CNN, VIT, and Hybrid (CNN+VIT) Model.

The findings definitively show that a hybrid methodology surpasses a purely autonomous architecture, achieving an overall accuracy of 95.1% and an F1-score of 93.9%. This ensemble method leverages the unique strengths of both CNNs and ViTs. The CNN effectively captures local spatial details, while the ViT's attention mechanisms enable it to learn long-range dependencies across the image. This complementary methodology results in significantly stronger and more reliable identification of skin conditions. Consider the critical example of melanoma detection - a missed diagnosis (false negative) could have life-threatening consequences for the patient if left uncorrected. In critical diagnostic scenarios, dermatologists serve a vital function by validating the machine learning system's recommendations, integrating these results with the patient's comprehensive health history, and confirming that the ultimate diagnosis aligns with their expert medical judgment.

Human involvement proves essential when addressing complicated medical cases that demand sophisticated interpretation beyond algorithmic capabilities. Seasoned physicians contribute contextual knowledge, diagnostic pattern recognition abilities refined through decades of clinical experience, and the capacity to evaluate variables that might not be readily visible in computerized imaging or statistical analysis.

The study results show that quantitative data validates the technical proficiency and precision of this combined methodology, establishing its value as an effective diagnostic resource.

5. Discussions

A groundbreaking methodology that merges Vision Transformers and Convolutional Neural Networks has demonstrated superior performance compared to individual model implementations. This study reveals that combining different computational frameworks enhances the system's capacity to address varied clinical situations and diverse patient populations, resulting in more reliable diagnostic outcomes.

This comprehensive platform provides substantial advantages by integrating India's traditional medicinal practices with contemporary technological solutions. Instead of depending exclusively on standard medical protocols, this strategy overcomes a critical gap in conventional healthcare delivery: it incorporates treatment methods that resonate with patients' cultural values and lived experiences. This fusion creates a meaningful connection between cutting-edge innovation and time-tested healing knowledge that communities have trusted across centuries.

The approach recognizes that effective healthcare must respect both scientific advancement and cultural heritage. By honoring traditional healing wisdom alongside modern diagnostic capabilities, the system creates a more inclusive and accessible healthcare environment. This integration proves particularly valuable in regions where conventional medical infrastructure may be limited, offering patients familiar treatment options that complement advanced diagnostic accuracy.

The combined methodology demonstrates how different technological approaches can work together more effectively than operating separately. This collaborative framework mirrors the broader philosophy of the system itself - that combining diverse knowledge sources and methodologies produces better outcomes than relying on any single approach in isolation. The result is a more robust, culturally sensitive, and clinically effective healthcare solution that serves patients more comprehensively.

6. Conclusion

In short, this study demonstrates how a hybrid approach to diagnosing skin diseases that employ a combination of Convolutional Neural Networks (CNNs) and Vision Transformers (ViTs) and therapy recommendations based on Indigenous Knowledge System (IKS) and moderated by human authority operates. This comprehensive strategy demonstrates how combining artificial intelligence with human expertise creates healthcare solutions that are more thorough, practical, and ethically sound. The integration ensures that technology serves to enhance rather than replace the irreplaceable elements of human medical care.

Moving forward, several important challenges must be addressed to maximize the system's potential. Scalability and broad applicability represent major hurdles that require careful attention. The current system would benefit significantly from expanding its training data to include uncommon and historically overlooked skin conditions. This expansion would make the model more useful across diverse populations and help eliminate existing biases that may affect certain groups disproportionately. Such improvements would strengthen the system's diagnostic accuracy and increase its positive impact in real clinical settings.

Equally important is the development of explainable artificial intelligence components that make the system's decision-making process clear and understandable. These transparency features are crucial for both medical professionals and patients who need to understand how the system reaches its conclusions. When the AI can clearly explain the reasoning behind its diagnostic suggestions, it builds greater confidence among users and enables doctors to make better-informed treatment decisions. This transparency also allows medical practitioners to critically evaluate and verify the AI's recommendations before implementing them.

Perhaps most significantly, creating lightweight versions of this hybrid system that work effectively on mobile devices could revolutionize healthcare access in underserved regions. By developing applications that function well on smartphones and tablets, this technology could reach remote communities and areas with limited medical infrastructure, bringing advanced diagnostic capabilities to populations who need them most. Its use with mobile technology could make accessible, real-time dermatological evaluations a reality, helping to bridge the gap in regions where specialist services are limited.

7. Future Research Directions

We also suggest future research avenues to improve IKS therapies for AI-based skin disease diagnosis. In order to accommodate a wide range of demographics, we suggest expanding the datasets, investigating lightweight models in addition to ensemble deep models, and utilizing multi-modal learning while incorporating patient metadata. The creation of phone-first platforms, real-time chatbot services, and integration with telemedicine for easier access and a worldwide scope are additional research avenues.

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