

Review

# Artificial Intelligence in Dermatology: Latest Scientific Advances and Future Perspectives

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## KEYWORDS

*Artificial Intelligence (AI), dermatology, machine learning, deep learning, image classification, diagnostic accuracy*

## ABSTRACT

Artificial intelligence (AI) is revolutionizing dermatology, offering enhanced diagnostic accuracy, early disease detection, and optimized patient management. This article reviews the latest scientific advancements in AI-based dermatological applications, focusing on melanoma detection, feature selection methods for image classification, and the integration of machine learning in dermatological practice. The study highlights current trends, challenges, and ethical considerations while discussing the potential of AI to transform skin disease diagnosis and treatment.

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## 1. Introduction

Dermatology, as a visual specialty, is particularly well-suited for AI-driven innovations. With the rise of machine learning and deep learning models, AI-powered systems are now capable of classifying skin lesions, predicting disease progression, and assisting dermatologists in clinical decision-making. Recent research has shown that AI-based models can match or even surpass human experts in diagnosing dermatological con-

ditions (Herrick et al., 2024) [PDF].

This article provides an overview of the latest AI applications in dermatology, emphasizing advancements in melanoma detection, feature selection in skin cancer classification, and the use of large language models (LLMs) in cosmetic dermatology.

## 2. AI Applications in Dermatology

### 2.1 AI in Melanoma and Skin Cancer Detection

Melanoma is one of the most aggressive skin cancers, requiring early and accurate detection. AI models based on convolutional neural networks (CNNs) have been trained on large datasets to differentiate between malignant and benign skin lesions. A recent study demonstrated that AI-based image classification methods significantly improved melanoma detection accuracy, reducing diagnostic errors among inexperienced dermatologists (Masood & Daniyal, 2025) [PDF].

Additionally, AI-driven image segmentation techniques are being developed to enhance the precision of dermoscopic analysis (Borna et al., 2025) [MDPI]. These models employ advanced deep learning methods to analyze skin lesion features, reducing interobserver variability in diagnostics.

tensure optimal patient care.

### 2.2 Large Language Models (LLMs) in Cosmetic Dermatology

Beyond medical dermatology, AI is making strides in cosmetic applications. Large Language Models (LLMs), such as ChatGPT and BERT, are being adapted to analyze dermatological patient records, recommend personalized skincare regimens, and assist in cosmetic dermatology procedures. A study by Landau and Krou-

mpouzos (2025) examined how LLMs can provide automated responses to common cosmetic concerns, improving patient engagement and clinic efficiency [PDF].

## 3. AI-Driven Image Classification and Feature Selection

Feature selection plays a crucial role in AI-based dermatological image classification. A recent study explored the effectiveness of various selection methods, such as Asymmetry, Border, Color, and Differential Structure (ABCD), in improving classification accuracy (Masood & Daniyal, 2025) [PDF].

In addition to traditional classification approaches, explainable AI models are being used to improve transparency and reliability in AI-driven dermatological assessments (Veeramani & Jayaraman, 2025) [Nature].

## 4. Challenges and Ethical Considerations

While AI presents significant advantages in dermatology, several challenges remain:

- Bias in AI Training Data: Most AI models are trained on datasets that predominantly contain images of light-skinned individuals, leading to disparities in diagnostic accuracy for darker skin tones.
- Regulatory Approval: AI-based medical devices require rigorous validation before clinical implementation.

- Data Privacy and Security: Handling sensitive patient data necessitates strict compliance with data protection regulations.
- Physician-AI Collaboration: AI should complement, rather than replace, human dermatologists. Clinicians must be trained in interpreting AI-generated results to ensure optimal patient care.

## 5. Conclusion

AI is poised to revolutionize dermatology by enhancing diagnostic accuracy, improving patient care, and optimizing cosmetic treatments. From melanoma detection to personalized skincare, AI-driven innovations are bridging the gap between technology and dermatological expertise. However, to fully realize its potential, challenges related to bias, ethical concerns, and

regulatory approval must be addressed. Future research should focus on improving AI model generalizability, incorporating diverse datasets, and ensuring seamless integration with clinical workflows.

## References

- Herrick, G., Susla, L., Frasier, K., Hassan, H., & Salisbury, S. (2024). AI to the Rescue: Revolutionizing Early Melanoma Detection with Machine Learning. PDF.
- Masood, A., & Daniyal, S. M. (2025). Enhancing Skin Cancer Detection: A Study on Feature Selection Methods for Image Classification. PDF.
- Borna, S., Gomez-Cabello, C. A., & Genovese, A. (2025). From Promise to Practice: Harnessing AI's Power to Transform Medicine. MDPI.
- Landau, M., & Kroumpouzou, G. (2025). Large Language Models in Cosmetic Dermatology. PDF.
- Veeramani, N., & Jayaraman, P. (2025). A promising AI-based super resolution image reconstruction technique for early diagnosis of skin cancer. Nature.