AI in Medical Service and Health Care

Thi ngoc Phung Cao / Soyeong Yi

2025.11.07

Index

Ⅰ. Introduction

In dermatology, the application of AI in skin cancer screening and diagnosis has been developed. This has become possible thanks to Deep Learning CNNs. Recent developments in CNNs enable AI models to integrate clinical data, analyze multiple lesions simultaneously, and learn from whole-slide images without manual annotation.

Ⅱ. Overview of SkinVision

SkinVision is an artificial intelligence-based application that can detect skin cancers from photos. It provides an easy way for ordinary people to screen for skin cancer. The app divides skin lesions into three risk categories and provides users with personalized advice about making a consultation with dermatologists.

Ⅲ. Data & Preprocessing

The dataset contained many images of skin lesions collected from dermatological sources. Each image was resized and normalized. Simple filters were used to remove noise. The lesion area was segmented using a U-Net model or cropped around the center of the image. Augmentation methods such as rotation, flipping, and contrast adjustment were applied. All images were converted to RGB, and their pixel values were scaled between 0 and 1. Low-quality or mislabeled images were removed.

Ⅳ. Core Algorithms

The SkinVision uses a deep learning model based on Convolutional Neural Networks (CNNs) to analyze smartphone images of pigmented skin lesions. The CNN extracts features such as color, shape, and border irregularity to classify lesions into low, medium, or high-risk categories. In a study of 1,204 lesions, the algorithm achieved “sensitivity 41–83 %, specificity 60–83 %, and AUROC 0.62–0.72, lower than dermatologists (AUROC > 0.90).” [1]

According to a systematic review by Freeman et al. (2021) in the British Journal of Dermatology, several smartphone apps, including SkinVision, were evaluated for diagnostic accuracy. The results showed high variability and limited reliability among these AI-based apps. In particular, some SkinVision studies were funded by the company itself, raising

Table 1

The sources of funding and conflicts of interest of each study included in the original review, and the related smartphone app(s) where relevant[4]

Study	App(s)	Sources of funding	Conflicts of interest declared
Robson 2012	MelApp	None	None declared
Wolf 2013	Apps (three) not named	National Institutes of Health grant	Yes: author was investigator and consultant for MELA Sciences, Inc.
Chadwick 2014	SkinScan, MelApp, Mole Detective, Spot Mole Plus, Dr Mole Premium	Not stated	Not stated
Maier 2015	SkinVision	SkinVision	Yes: two authors were consultants for SkinVision
Dorairaj 2017	App (one) not named	Not stated	None declared
Nabil 2017	SkinVision	Not stated	Not stated
Thissen 2017	SkinVision	SkinVision	Yes: two authors received fees
Chung 2018	SkinVision	None	None declared
Ngoo 2018	SkinVision, SpotMole, Dr Mole	National Health and Medical Research Council grant	Yes: author is a shareholder of e-derm consult GmbH and MoleMap by Dermatologists Ltd Pty

Picture 1. The sources of funding and conflicts of interest of each study included in the original review, and the related smartphone app(s) where relevant [2]

Ⅴ. Evaluation Metrics

In a study of 1,204 skin lesions, the SkinVision classified 19 % as suspicious, while dermatologists found only 0.7 %. This means the app produced a 27-fold higher rate of melanoma-suspect cases.

The over-detection reflects the app’s lower specificity and higher tendency for false positives, which could lead to unnecessary anxiety or excisions. Nevertheless, such results demonstrate how AI-based tools like SkinVision can enhance screening awareness but still require dermatologist validation to ensure clinical reliability.

Ⅵ. Testing SkinVision

This is a video demonstration of how to use the app.

How to use SkinVision? - YouTube

Ⅶ. Conclusion

i. Positive

The SkinVision shows the potential of AI in healthcare by making skin cancer screening more accessible. Its CNN-based algorithm supports early self-assessment and has shown sensitivity up to 87 % and specificity around 80 % in controlled studies.

Ii. Negative

In real-world settings, accuracy is lower than dermatologists (sensitivity 41–83 %, specificity 60–83 %, AUROC 0.62–0.72). The app often over-detects high-risk lesions, causing false positives, and some company-funded studies raise concerns about bias and the need for independent validation

Ⅷ. Reference

[1] Greis, C., Lallas, A., Tschandl, P., Menzies, S., Marghoob, A., Blum, A., Rinner, C., et al. (2022). **Over-Detection of Melanoma-Suspect Lesions by a CE-Certified Smartphone App: Performance in Comparison to Dermatologists, 2D and 3D Convolutional Neural Networks in a Prospective Data Set of 1204 Pigmented Skin Lesions Involving Patients' Perception.** *PLOS ONE / PMC*. https://pmc.ncbi.nlm.nih.gov/articles/PMC9357134/

[2] Freeman, K., Dinnes, J., Chuchu, N., Takwoingi, Y., Bayliss, S. E., Matin, R. N., ... & Deeks, J. J. (2020). **Algorithm-based smartphone apps to assess risk of skin cancer in adults: critical appraisal of a systematic review.** *British Journal of Dermatology*, 183(2), 167–180. https://academic.oup.com/bjd/article/184/4/638/6603041

[3] Sharma, Y., Sinha, S., & Kaur, P. (2021). **Skin Cancer Detection and Classification Using Neural Network Algorithms: A Systematic Review.** *Cancers*, 13(17), 4314. *PubMed Central (PMC)*. https://pmc.ncbi.nlm.nih.gov/articles/PMC8430617/

IV. Link Github

CUT/Lab_01 at Elements_of_Artificial_Intelligence · NgocPhungggg/CUT