Artificial Intelligence evaluation of dermoscopy images of pigmented lesions

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Introduction

- Early detection of malignant melanoma is critical as prognosis depends strongly on tumor thickness and worsens dramatically after distant metastases.
- Currently, visual examination aided by dermoscopy is the most routinely applied standard screening method for skin cancer detection. However, correct diagnosis of pigmented skin lesions heavily depends on the physicians' experience and training.
- Recent developments in neural network approaches (i.e. "deep convolutional learning algorithms") have already significantly advanced clinical performance in many different areas.
- This technology has been shown to provide a melanoma detection strategy equal to experienced dermatologists assessing the same dermoscopic images[1] and has a high sensitivity and specificity in diagnosing melanoma in suspicious pigmented lesions[2].
- Few studies have described that Artificial Intelligence (AI) technology can be used to improve physician specificity, sensitivity, and accuracy in diagnosing melanoma[3].

Objectives

This study aims to analyze the performance of the MoleAnalyzer Pro AI software, developed by the company FotoFinder Systems, in classifying dermoscopy images of pigmented lesions as benign or malignant, compared to histopathologic diagnosis.

Methods

1. Retrospectively collected dermoscopy images of clinically suspicious pigmented lesions that have also been biopsied and given histopathologic diagnoses.
2. Presented the images to the MoleAnalyzer Pro AI software to determine if each lesion is benign or malignant. The AI software generated a malignancy score of >0.5 for predicted malignant lesions, and <0.5 for predicted benign lesions.
3. Sensitivity, specificity, accuracy, Inter-rater agreement (kappa), and receiver operating characteristic (ROC) curve was calculated.

Results

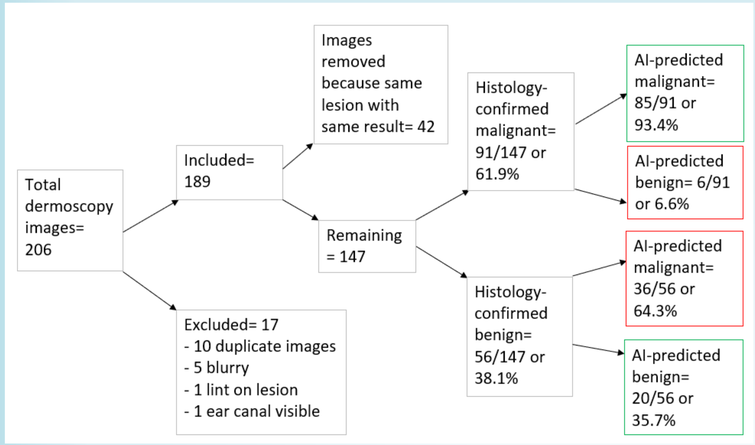


Figure 1: Inclusion/Exclusion of dermoscopy images

		AI-predicted		
		Malignant	Benign	
Histology-confirmed	Malignant	85	6	Sensitivity= 85/(85+6)= 93.4%
	Benign	36	20	Specificity= 20/(20+36)= 35.7%

Figure 2: Sensitivity and Specificity of AI prediction vs Histologic diagnosis

Weighted Kappa[a]	0.32466
Standard error	0.07469
95% CI	0.17827 to 0.47105

[a] Linear weights

Figure 3: Kappa inter-rater agreement between AI prediction and Histologic diagnosis

Area under the ROC curve (AUC)

Area under the ROC curve (AUC)	0.773
Standard Error [a]	0.0404
95% Confidence interval [b]	0.697 to 0.838
z statistic	6.764
Significance level P (Area=0.5)	<0.0001

[a] DeLong et al., 1988
[b] Binomial exact

Figure 4a: Area under the receiver operating characteristic (ROC) curve

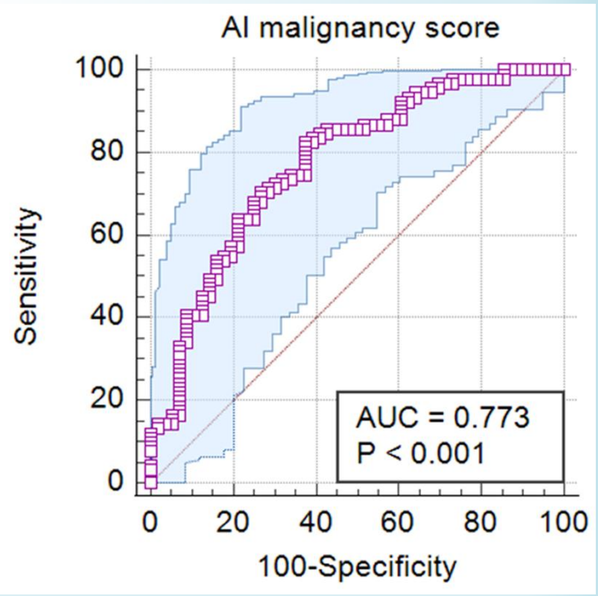
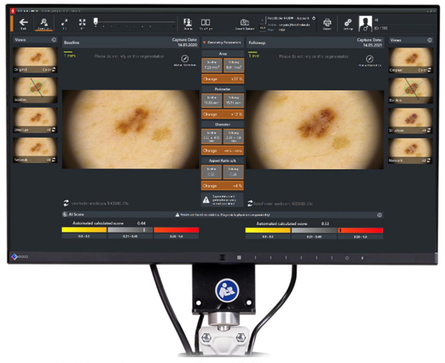


Figure 4b: Area under the receiver operating characteristic (ROC) curve



Picture 1: MoleAnalyzer Pro AI Software

Discussion and Conclusion

- The MoleAnalyzer Pro AI software was found to have high sensitivity for detecting melanoma in retrospective dermoscopy images.
- Integration of this tool in clinical practice may aid in dermatologist screening methods for melanoma.
- Limitations to this study include images derived from different, non-standardized dermatoscopes, and a greater proportion of melanomas than would be seen in clinical practice.
- Future directions include comparing AI performance to dermatologists, and studying the changes in clinical decision making when incorporating AI malignancy scores.

Disclaimers

This research is unfunded. We have not received funding from FotoFinder Systems or any other source to complete this research.

References

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