



# **Artificial Intelligence and Skin Cancer**

Research Papers Data

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<u>Sr No</u>	<u>Paper Title</u>	<u>Authors</u>	<u>Dataset</u>	<u>Algorithm</u>	<u>Metrics</u>	<u>Results</u>
1	Artificial intelligence and skin cancer	Maria L. Wei, Mikio Tada, Alexandra So, Rodrigo Torres	Rotemberg et al. dataset	Convolutional Neural Networks (CNNs), Generative Adversarial Networks (GANs), Recurrent Convolutional Networks with attention	Sensitivity, Specificity, Accuracy, Uncertainty Estimates	Performance Metrics <b>Pre-biopsy Tests:</b> Sensitivity: 94% Specificity: 69% Improved Sensitivity with TERT mutation: 97% <b>AI and Machine Learning Models:</b> <b>Accuracy of Deep Learning Algorithms:</b> Sensitivity: 95% Specificity: 76.7% Compared to dermatologists (Level I): Sensitivity: 89%, Specificity: 80.7% Compared to dermatologists (Level II): Sensitivity: 94.1%, Specificity: 80.7% ISIC Challenge Results:  <b>2016: Avg. Precision:</b> 0.637 2017: AUC: 0.874 2018: Balanced Multi-class Accuracy: 0.885 2019: Balanced Multi-class Accuracy: 0.636
2	Skin cancer diagnosis using artificial intelligence methods: A review of the most recent research	Yousra Dahdouh, Abdelhakim Boudhir Anouar, Mohamed Ben Ahmed	ISIC Archive, HAM10000, PH2 Database, MedNode Dataset, Dermofit Image Library	K-Nearest Neighbors (KNN), Artificial Neural Networks (ANN), Decision Trees, Random Forests, Support Vector Machines (SVM), Convolutional Neural Networks (CNN), VGG16, ResNet (Residual Networks), InceptionV3, DenseNet (Densely Connected Convolutional Networks), Recurrent Neural Networks (RNN)	Accuracy, Precision, Recall (Sensitivity), F1 Score, Specificity, Area Under the Receiver Operating Characteristic Curve (AUC-ROC), Confusion Matrix	<b>Algorithm Performance on Datasets:</b> <b>HAM10000:</b> Accuracy with ANN: 97.4% Accuracy with Transfer Learning: 90% Accuracy with CNN+SVM: 96.2% <b>ISIC:</b> CNN (2018): 83.2% Deep CNN (2017): 95.0% ResNet50, Xception, and VGG16: 90.9% <b>PH2:</b> ANN: 92.5% SVM: 89.5% KNN: 82.0% DT: 90.0%

						<b>ISBI 2016:</b> Hybrid model (Pretrained- network+SVM): 88.02%
3	Artificial Intelligence in Dermoscopy: Advancements, Challenges, and Future Directions for Early Skin Cancer Detection	Kelly Frasier, Michelle Sobotka, Saad Javaid, Vivian Li, Julia Vinagolu-Baur	Open-source, Non-commercial AI Algorithm Dataset, Dataset for AI Device Validated by FDA, Diverse Skin Tone Training Dataset	Convolutional Neural Networks (CNNs), Deep Learning Techniques, Machine Learning Algorithms, Algorithm Refinement for Diverse Populations	Accuracy, Sensitivity (Recall), Specificity, Precision (Positive Predictive Value), F1 Score, Area Under the Receiver Operating Characteristic Curve (AUC-ROC)	<b>Study by Anderson et al:</b> AI Model Performance: Specificity and accuracy were significantly higher than dermatologists with statistical significance ( $P<0.05$ ), <b>Study by Esteve et al:</b> AI Model: Classified skin cancer lesions as accurately as dermatologists, <b>Van Molle et al.:</b> CNN Sensitivity: 50% CNN Specificity: 80% Average Dermatologist Sensitivity: 68% Average Dermatologist Specificity: 73%, <b>Bias and Limitations:</b> False-Positive Rate: 40% higher for benign nevi due to surgical pen markings, <b>Prospective Study by Marchetti et al.:</b> Dermatologists' Management Change with AI: 29% cases avoiding skin biopsy (0-39% range)
4	Naturalize Revolution: Unprecedented AI-Driven Precision in Skin Cancer Classification Using Deep Learning	Mohamad Abou Ali, Fadi Dornaika, Ignacio Arganda-Carreras, Hussein Ali, Malak Karaouni	The ISIC 2019 dataset is a large collection of high-quality dermoscopic images used for research in skin cancer detection. It includes various skin lesion types, both benign and malignant.	Convolutional Neural Networks (CNN), Vision Transformer (ViT), Transfer Learning, Segment Anything Model (SAM), Score-CAM	Accuracy, Precision, Recall, F1-Score, Confusion Matrices, Classification Reports	Best Performing Model: <b>DenseNet-201:</b> <b>Validation Accuracy:</b> 0.95 <b>Testing Accuracy:</b> 0.95 <b>Precision:</b> 0.95 <b>Recall:</b> 0.95 <b>F1-Score:</b> 0.95 <b>ConvNextBase:</b> <b>Validation Accuracy:</b> 0.95 <b>Testing Accuracy:</b> 0.92 <b>Precision:</b> 0.93 <b>Recall:</b> 0.92 <b>F1-Score:</b> 0.92

						<b>VGG16:</b> <b>Validation Accuracy:</b> 0.93 <b>Testing Accuracy:</b> 0.94 <b>Precision:</b> 0.94 <b>Recall:</b> 0.94 <b>F1-Score:</b> 0.94 <b>InceptionResNetV2:</b> <b>Validation Accuracy:</b> 0.90 <b>Testing Accuracy:</b> 0.89 <b>Precision:</b> 0.90 <b>Recall:</b> 0.89 <b>F1-Score:</b> 0.89
5	Artificial intelligence-based image classification methods for diagnosis of skin cancer: Challenges and opportunities	Manu Goyal, Thomas Knackstedt, Shaofeng Yan, Saeed Hassanpour	Interactive Atlas of Dermoscopy, Dermofit Image Library, PH2 Dataset, MED-NODE Dataset, Asan Dataset, Hallym Dataset, SD-198 Dataset, SD-260 Dataset	Deep Learning Algorithms, Convolutional Neural Networks (CNNs), Ensemble Models, Multi-Task Learning Models, Transfer Learning Algorithms, Hybrid Models, Data Fusion Algorithms, Cloud-Based Models	Accuracy, Sensitivity (Recall), Specificity, Precision, F1 Score, Area Under the Receiver Operating Characteristic Curve (AUROC), Balanced Accuracy, Diagnostic Odds Ratio, Positive Predictive Value (PPV), Negative Predictive Value (NPV), Matthews Correlation Coefficient (MCC)	<p><b>Yang et al.:</b> Achieved 57.62% accuracy using the ABCD rule on the SD-198 dataset, while ResNet achieved 53.35%. Senior clinicians had 83.29% accuracy.</p> <p><b>Han et al.:</b> ResNet-152 performed on par with 16 dermatologists on a 480-image test set and outperformed in diagnosing basal cell carcinoma (BCC).</p> <p>Fujisawa et al.: Deep learning method achieved 76.5% accuracy on 6009 images, outperforming 13 dermatologists (59.7%) and nine trainees (41.7%).</p> <p>Brinker et al.: ResNet50 model achieved 89.4% sensitivity, 69.2% specificity, and AUROC of 0.769, outperforming 145 dermatologists who had 89.4% sensitivity, 64.4% specificity, and AUROC of 0.769.</p>

