

## A Study on the Application of Machine Learning and Deep Learning Techniques for Skin Cancer Detection

**Authors :** Hritwik Ghosh, Irfan Sadiq Rahat, Sachi Nandan Mohanty, J. V. R. Ravindra

**Abstract :** In the rapidly evolving landscape of medical diagnostics, the early detection and accurate classification of skin cancer remain paramount for effective treatment outcomes. This research delves into the transformative potential of Artificial Intelligence (AI), specifically Deep Learning (DL), as a tool for discerning and categorizing various skin conditions. Utilizing a diverse dataset of 3,000 images representing nine distinct skin conditions, we confront the inherent challenge of class imbalance. This imbalance, where conditions like melanomas are over-represented, is addressed by incorporating class weights during the model training phase, ensuring an equitable representation of all conditions in the learning process. Our pioneering approach introduces a hybrid model, amalgamating the strengths of two renowned Convolutional Neural Networks (CNNs), VGG16 and ResNet50. These networks, pre-trained on the ImageNet dataset, are adept at extracting intricate features from images. By synergizing these models, our research aims to capture a holistic set of features, thereby bolstering classification performance. Preliminary findings underscore the hybrid model's superiority over individual models, showcasing its prowess in feature extraction and classification. Moreover, the research emphasizes the significance of rigorous data pre-processing, including image resizing, color normalization, and segmentation, in ensuring data quality and model reliability. In essence, this study illuminates the promising role of AI and DL in revolutionizing skin cancer diagnostics, offering insights into its potential applications in broader medical domains.

**Keywords :** artificial intelligence, machine learning, deep learning, skin cancer, dermatology, convolutional neural networks, image classification, computer vision, healthcare technology, cancer detection, medical imaging

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