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Melanoma Leson Prediction using Inception V3 Model

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Abstract: *Skin cancer is one of the most common dermatological issues, with melanoma being the most aggressive type, making early and accurate diagnosis essential for improving patient outcomes. Conventional diagnostic methods depend on dermatoscopic evaluation and clinical knowledge, yet precise classification is difficult due to the variability in skin lesions. To overcome these difficulties, utilizing computer-assisted skin cancer detection through deep learning-based feature extraction and classification presents a scalable and effective solution. This research introduces a diagnostic model based on Inception V3 aimed at improving feature extraction, classification efficiency, and computational optimization. The approach involves preprocessing high-resolution dermoscopic images, followed by the extraction of deep features through the factorized convolution layers of Inception V3, which enhances model generalization while minimizing computational demands. The acquired features, including texture, color patterns, and lesion morphology, are input into a convolutional classification model that has been fine-tuned to differentiate between normal skin, benign lesions, and malignant melanoma cases. This classification method employs transfer learning, utilizing the pretrained Inception V3 network with a customized dense-layer configuration, and optimizes predictions using Softmax activation for multi-class classification or Sigmoid for binary classification. The performance of this model is thoroughly assessed against traditional machine learning techniques such as Support Vector Machines (SVM), Random Forest (RF), and K-Nearest Neighbors (KNN). Metrics like accuracy, precision, recall, and F1-score are calculated to compare the effectiveness of deep learning with conventional methods. The aim is to create a strong, scalable, and clinically interpretable AI-based melanoma classification system that assists both non-specialized users and medical professionals in the early detection and intervention of the disease, ultimately lowering the mortality and morbidity rates linked to skin cancer.*

Keywords: Skin cancer, deep learning techniques, Inception V3 architecture, feature extraction methods, convolutional neural networks (CNNs), digital dermatoscopy, transfer learning approaches, melanoma identification

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