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Deep Learning for the Classification of Skin Cancer Subtypes

A dissertation by

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Abstract

Skin cancer poses a significant health risk, demanding precise diagnosis to ensure prompt intervention. Human-based classification of skin cancer subtypes is prone to inconsistency, potentially causing delays and misdiagnoses. With the rising cases of skin cancer, an accurate and efficient approach for early detection is imperative. Current automated systems lack the required precision and accessibility. Hence, an innovative deep learning solution is essential to address these challenges and offer dependable subtype classification.

Our endeavor, SkinSafe, introduces a web-based platform that harnesses the capabilities of deep learning to automate the classification of skin cancer subtypes. Leveraging an extensive dataset of diverse skin images, we train a deep neural network model. This model proficiently distinguishes between various lesions, such as melanoma, basal cell carcinoma, and squamous cell carcinoma. Through a user-friendly web interface, individuals can seamlessly upload their skin images for processing and classification. SkinSafe incorporates advanced image preprocessing, data augmentation, and deep learning architectures, fortifying the accuracy and reliability of the classification process.

Comprehensive evaluations robustly validate SkinSafe's effectiveness, with the model achieving an impressive 74% F1 score. The system notably outperforms prevailing methods in both precision and accuracy. Its true strength is in supporting medical practitioners, amplifying diagnostic speed and precision, thereby enhancing treatment efficacy. User feedback and acceptance studies underscore the system's ease of use and practicality, solidifying its potential for widespread adoption within clinical contexts.

Keywords: Skin cancer, Classification, Deep learning, Subtypes, Automated diagnosis, Diagnosis improvement, Treatment outcomes, Early detection, Medical professionals, Image preprocessing, Data augmentation

Subject Descriptor:

- Security and privacy → Health informatics → Medical image analysis
- Computing methodologies → Artificial intelligence → Machine learning → Machine learning approaches → Neural networks