Detection of Skin Diseases using Deep Learning: A Study of Sri Lankan Patients

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Abstract: Skin disease detection is a critical component of dermatological healthcare, traditionally dependent on dermatologists' expertise for accurate diagnosis. However, manual diagnosis can be time-consuming and prone to errors, especially in regions with limited access to specialized care. This often leads to self-diagnosis and improper treatment based on inadequate knowledge, potentially worsening conditions and leading to severe complications. To address these issues, this study proposes a novel approach utilizing deep learning techniques for the automated detection of skin diseases. We employed state-of-the-art deep learning architectures, including VGG16, VGG19, EfficientNetB0, and ResNet50, to classify four prevalent skin conditions: Eczema (Dermatitis), Psoriasis, Tinea, and Vitiligo. A comprehensive dataset of 600 images from these classes was collected from Vavuniya General Hospital, Sri Lanka. To our knowledge, this is the first study to apply deep learning for skin disease detection, specifically in Sri Lankan patients. The images underwent preprocessing, annotation, and data augmentation to enhance the models' ability to capture distinct features of each condition. Performance evaluations revealed that VGG16 and ResNet50 achieved accuracies of 87%, while VGG19 and EfficientNetB0 also showed strong results. To further improve predictive performance, these models were combined into an ensemble model, achieving a final accuracy of 91%. The application of this ensemble model in clinical settings offers a promising tool for enhancing diagnostic accuracy and efficiency, particularly in areas with limited access to specialized dermatological services. This research fills a significant gap in the field of medical image analysis, providing a foundation for future advancements in automated skin disease detection among Sri Lankan patients and aiming to improve healthcare outcomes in resource-constrained environments.

Keywords: Skin disease, Deep Learning, Ensemble model, Sri Lankan patients