

Classification of Sri Lankan Skin Diseases Using Ensemble Deep Learning Models

Kayalvizhy Thapalingasivam
Dept. of Physical Science
University of Vavuniya
Vavuniya, Sri Lanka
thapamkayal@gmail.com

Veerapathirapillai Vinoharan
Dept. of Information and Communication Technology
University of Vavuniya
Vavuniya, Sri Lanka
v.vinoharan@vau.ac.lk

Pirabakaran Sivanesan
Consultant Dermatologist
District General Hospital
Vavuniya, Sri Lanka
praba5050@gmail.com

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. 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 South Asian skin types, particularly type IV and V 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%. To make this research practically applicable, a Flask application was developed that allows users to upload an image of a skin disease that predicts the disease name. This research fills a significant gap in medical image analysis, providing a foundation for future advancements in automated skin disease detection.

Index Terms—Sri Lankan Skin disease, Deep Learning, Convolutional Neural Network.

I. INTRODUCTION

Skin diseases are a prevalent health concern affecting millions of people worldwide, with a wide range of conditions from mild and easily treatable to severe and potentially life-threatening. According to the World Health Organization (WHO), skin diseases significantly contribute to the global burden of disease, impacting quality of life, mental health, and socioeconomic well-being [1]. Early diagnosis and treatment are crucial for improving patient outcomes and preventing complications. Traditionally, dermatologists diagnose skin diseases through visual inspection of skin lesions, a method that can be subjective and time-consuming [2], [3]. This process can be particularly challenging for novice practitioners and in regions lacking access to dermatological expertise.

The diversity and complexity of skin diseases make accurate diagnosis a demanding task [2]. Common conditions such as



Fig. 1: Skin Diseases

Eczema (Dermatitis), Psoriasis, Tinea, and Vitiligo shown in the figure 1 exhibit varied clinical manifestations, requiring extensive knowledge and experience for precise identification. Misdiagnosis can lead to inappropriate treatments, exacerbating the patient's condition and increasing healthcare costs. Recent advancements in digital image processing, computer vision, and artificial neural networks have opened new avenues for automating skin disease diagnosis [2]. Deep learning algorithms, a subset of machine learning, use artificial neural networks to learn from data. These networks can be trained on large datasets of skin lesion images to identify patterns associated with specific diseases, offering a promising solution to the limitations of traditional diagnostic methods. Several studies have demonstrated the effectiveness of deep learning for skin disease diagnosis, achieving accuracy comparable to or even surpassing that of experienced dermatologists. This research aims to leverage deep learning techniques to detect and classify skin diseases in Sri Lankan patients. Conducted at Vavuniya District General Hospital, the study will focus on collecting a diverse dataset of skin images from patients with various dermatological conditions. By employing an ensemble of state-of-the-art deep learning architectures, specifically VGG16, VGG19, ResNet50, and EfficientNetB0, this study seeks to develop a robust model capable of accurately diagnosing multiple skin diseases.

The main contribution of this paper is summarised below:

- Develop a Deep Learning Model: To create an automated system for the classification of skin diseases using deep learning techniques.
- Assess Model Performance: To evaluate the performance of the model on a dataset comprising images from patients at Vavuniya District General Hospital, ensuring the model's applicability to the Sri Lankan population.
- Contribute to Dermatology: To provide valuable insights