

Deep Learning Framework for Identification of Skin Lesions

Nonita Sharma^{1,*}, Monika Mangla², M. Mohamed Iqbal³ and Sachi Nandan Mohanty⁴

¹Department of Information Technology, Indira Gandhi Delhi Technical University for Women, Delhi, India

²School of computer science & Engineering, Dwarkadas J Sanghvi College of Engineering, Mumbai, India

³School of computer science & Engineering, VIT-AP University, Amaravati, Andhra Pradesh, India

⁴Department of Computer Science & Engineering, Vardhaman College of Engineering, Hyderabad, India

Abstract

Skin ailments don't just affect the physical appearance of an individual but also lead to psychological issues. Vitiligo and discoloration patches are such conditions that can negatively impact one's self-assurance. Here, authors have designed 14 distinct models to classify skin lesions using the HAM10000 dataset which is sorted into 7 classes including Actinic Keratosis, Melanocytic nevi, Actinic keratoses, Melanoma, Benign keratosis-like lesions, Basal cell carcinoma, and Vascular lesions. Further, authors compared their model against other state-of-the-art models, and additionally employed various pre-trained models like Resnet50, InceptionV3, MobileNetV2, Densenet201, VGG16, VGG19, InceptionResnetv2, Xception, EfficientNetB0, EfficientNetB1, EfficientNetB2, EfficientNetB3, EfficientNetB4, EfficientNetB5 that were trained on image net datasets. Their primary aim was to develop a framework that can be implemented in real-world applications using Efficient Nets. Experimental evaluations have shown that their proposed models have outperformed traditional pre-trained models like ResNets and VGG16 in terms of accuracy, precision, recall, and validation loss, despite being lightweight. Interestingly, this improvement was achieved without any data augmentation techniques. The authors achieved accuracy above 90% for all the EfficientNet models (B0-B5), which was far better than the existing pre-trained models, thus establishing the supremacy of proposed model.

Keywords: Convolutional Neural Network, Grey Level Co-occurrence Matrix, Rectilinear Unit, Stochastic Gradient Descent

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1. Introduction

Recent reports from the World Health Organization (WHO) have confirmed a significant increase in the number of cases of skin cancer over the past decade. As of 2021, there have been approximately 2.3 million cases of non-melanoma skin cancer and 1.06 million cases of melanoma skin cancer reported worldwide. Shockingly, one out of every three cases is diagnosed as skin cancer. Non-melanoma and melanoma are the two most prevalent types of skin cancers, with basal cell carcinoma and squamous cell carcinoma being the most

common types of non-melanoma tumors. However, these tumors have a high chance of being cured if detected early.

Skin cancer occurs when one of three types of cells, namely Langerhans cells, melanocytes, or keratinocytes, replicate irregularly, causing the skin to grow abnormally. As these cells continue to replicate, skin cancer can spread to other parts of the body through the lymphatic system.

Non-melanoma is the fifth most commonly occurring skin cancer in both genders and is more prevalent than melanoma, which is the 19th most commonly occurring cancer. Melanoma is a rare and aggressive form of skin cancer that develops in melanocytes, which are cells that produce the skin pigment melanin. It is primarily caused by prolonged

*Corresponding author. Email: nonitasharma@igdttuw.ac.in

