

ABSTRACT

Multi-class Colorectal Polyp Histopathology Classification Using EfficientNetV2

By

Muhammad Rasikh Azfa Riyyasy

21110005

Colorectal polyps are one of the leading causes of cancer-related deaths worldwide. Histopathological classification of colorectal polyps is crucial for early detection and prevention of colorectal cancer. This study develops a deep learning model based on EfficientNetV2 to classify histopathological images of colorectal polyps into three main classes: Normal, Hyperplastic, and Tubular Adenoma. The dataset, obtained from Unitopatho via IEEE Dataport, consists of 1,942 images with an imbalanced class distribution. To address this imbalance, data augmentation techniques including rotation, flipping, CLAHE, and blur were applied, increasing each class to 1,500 images. All images were resized to 224x224 pixels. The model was evaluated using three variants of EfficientNetV2 (B0, B1, and B2) employing transfer learning and fine-tuning methods. Experimental results demonstrate that using GlobalAveragePooling2D outperformed MaxPooling2D, and fine-tuning the last 10 layers improved the highest validation accuracy to 93.83%. This study confirms that combining EfficientNetV2, data augmentation, and fine-tuning can significantly enhance the performance of colorectal polyp histopathological classification. The proposed model has the potential to assist pathologists in faster and more accurate diagnosis, thereby supporting effective prevention and management of colorectal cancer.

Keywords: Histopathology; Colorectal Polyps; Image Classification; Convolutional Neural Network; EfficientNet;