

# Performance Analysis of Transfer Learning Methods for Malaria Disease Identification

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Malaria has become a widespread disease and one of the leading causes of many deaths worldwide. Malaria is a blood disease brought on by Plasmodium parasites, which are transmitted by the bite of a female Anopheles mosquito. To diagnose the condition, medical experts analyse thick and thin blood smears. However, their precision is dependent on the quality of the smear and experience in categorising and counting parasitized and uninfected cells. Such an investigation could be complicated and time-consuming for large-scale diagnosis, resulting in poor quality as well. Deep learning (DL) approaches such as Convolutional Neural Networks (CNN) offer highly scalable and improved performance with end-to-end feature extraction and classification in cutting-edge image analysis-based computer-aided- diagnosis (CAD) procedures. Automated malaria screening employing DL approaches could contribute in the development of an effective diagnostic aid. In this study, we assessed the efficacy of VGG16, EfficientNetB3, InceptionV3, and ResNet50 as feature extractors to categorise parasitized and uninfected cells and aid in enhanced malaria disease screening. Our results showed that optimum accuracy of 0.97 is achieved after 40 epochs. Our study demonstrated the successful application of deep learning techniques, specifically ResNet50 and EfficientNetB3, among the analysed models, for malaria disease screening and detection.

**Keywords:** *machine learning, deep learning, convolutional neural networks (CNN), transfer learning, malaria disease detection*