

ABSTRACT

Diabetic Retinopathy (DR) is a common complication of diabetes, characterized by damage to the retinal blood vessels, which can lead to vision impairment or blindness if left undiagnosed and untreated. Early detection is crucial for effective intervention and prevention. In recent years, deep learning techniques, particularly convolutional neural networks (CNNs), have shown great promise in automating the diagnosis of DR from retinal images. This paper presents a novel approach to predicting diabetic retinopathy using deep learning models. We propose a system that leverages a CNN architecture trained on large-scale retinal image datasets to classify the severity of DR into different stages, ranging from no DR to proliferative diabetic retinopathy. The model is trained and evaluated on publicly available datasets, such as the Kaggle Diabetic Retinopathy Detection dataset, and achieves high accuracy in detecting DR features such as microaneurysms, hemorrhages, and exudates. Our results demonstrate the potential of deep learning in providing accurate, cost-effective, and timely DR screening, which could assist ophthalmologists in diagnosing and monitoring diabetic retinopathy. We also discuss the challenges of dataset imbalance, overfitting, and the need for explainability in medical AI systems. This study highlights the potential of integrating deep learning models into routine clinical practices for the automated monitoring and management of diabetic retinopathy.