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An Artificial Intelligence System for Diabetic Retinopathy Diagnosis Using Biomedical Engineering and Deep Learning Techniques

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Abstract

Diabetic retinopathy is a common complication of diabetes that can lead to blindness if not detected early. This research aims to develop an artificial intelligence-based system that utilizes biomedical engineering and deep learning techniques to accurately and automatically diagnose diabetic retinopathy from fundus images. The proposed system employs a deep learning model based on Convolutional Neural Networks (CNN) to classify images into various categories according to the severity of the disease. The model is trained using publicly available datasets such as the Kaggle Diabetic Retinopathy Detection Dataset and APTOS 2019 Blindness Detection Dataset. The model's performance is enhanced through techniques like Transfer Learning and Data Augmentation. This system provides a reliable and efficient diagnostic tool that supports healthcare professionals in early disease detection, contributing to improved healthcare quality and reducing blindness cases.