

Retinology AI

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Abstract: *Diabetic Retinopathy (DR) remains a major cause of preventable blindness, particularly in low-resource regions of India. This paper presents Retinology AI, a desktop-based application that integrates deep learning (ResNet50) with an intuitive Tkinter graphical interface to automatically classify retinal fundus images into five severity stages: Normal, Mild, Moderate, Severe, and Proliferative. The system operates fully offline, using ImageNet-pretrained features combined with statistical image analysis for brightness, contrast, and lesion detection. Upon analysis, the application generates a professional PDF report that includes diagnostic classification, confidence levels, and follow-up recommendations. Experimental results demonstrate rapid inference (<3 seconds), high accuracy (85–90%), and realistic confidence estimation, validated across multiple test images. The project aims to support early DR screening in resource-constrained Indian settings while ensuring patient data privacy and low deployment costs.*

Keywords: Diabetic Retinopathy, Deep Learning, ResNet50, Offline AI, Medical Image Analysis, Python Tkinter

