

SmartDR+: Extensible Retinal Disease Detection Platform

Sagar Shankar Khandagale, Tejas Laxman Kharche, Prathamesh Kiran Khule
Jayesh Bhikaji Pendharkar, Prof. H. S. Borse

Department of AI & DS Engineering
PVG's College of Engineering, Nashik
Savitribai Phule Pune University

sagarkhandagale033@gmail.com, kharchetejas84@gmail.com, prathameshkhule.dev@gmail.com
jayeshpendharkar27@gmail.com, hansa.shimpi@pvgoenashik.org

Abstract: *Diabetic Retinopathy (DR) is one of the most prevalent causes of preventable blindness, particularly in diabetic patients. The increasing number of diabetic cases worldwide has made early screening for retinal abnormalities more critical than ever. This paper presents SmartDR+, a scalable and extensible deep learning-based framework for automated detection of DR from high-resolution retinal fundus images. The system integrates robust preprocessing techniques, transfer learning using lightweight backbones, and interpretability through Grad-CAM heatmaps [2], [4], [5], [1], [3], [6]. SmartDR+ can operate efficiently on both cloud and edge devices [2], [4], [5], [1], [3], [6], providing cost-effective, explainable, and real-time screening. Experimental evaluations on the APTOS and EyePACS datasets demonstrate competitive accuracy and interpretability. The system provides a promising direction for AI-assisted ophthalmology and telemedicine applications in rural healthcare.*

Keywords: Diabetic Retinopathy, Fundus Imaging, Deep Learning, MobileNetV2, Explainable AI, Grad-CAM, Transfer Learning, Edge AI, Medical Image Processing

