Title:-

Deep Learning Assisted Retinopathy of Prematurity Screening

Abstract:-

Retinopathy of prematurity (ROP) is a leading cause of blindness in premature infants worldwide, particularly in developing countries. In this research, we propose a Deep Convolutional Neural Network (DCNN) and image processing-based approach for the automatic detection of retinal features, including the optical disc (OD) and retinal blood vessels (BV), as well as disease classification using a rule-based method for ROP patients. Our DCNN model uses YOLO-v5 for OD detection and either Pix2Pix or U-Net for BV segmentation. We trained our DCNN models on publicly available fundus image datasets of size 1,117, and 288 for OD detection and BV segmentation, respectively. We evaluated our approach on a dataset of 439 preterm neonatal retinal images, testing for ROP Zone and 6 BV masks. Our proposed system achieved excellent results, with the OD detection module achieving an overall accuracy of 98.94% (when IoU 0.5) and the BV segmentation module achieving an accuracy of 96.69% and a Dice coefficient between 0.60 and 0.64. Moreover, our system accurately diagnosed ROP in Zone-1 with 88.23% accuracy. Our approach offers a promising solution for accurate ROP screening and diagnosis, particularly in low-resource settings, where it has the potential to improve healthcare outcomes.