

BioEyeNet: An Optimized Deep Learning Framework for Classification & prediction of Keratitis and Uveitis

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Abstract: Millions of people worldwide suffer from keratitis and uveitis, with cases increasing due to restricted access to specialized care and limited local resources, delaying diagnosis and raising healthcare costs. Once ignored, such diseases may result in severe visual impairment or blindness. Early detection is crucial, yet manual diagnosis remains time-consuming, error-prone, and lacks scalability. This study proposes an AI-powered deep learning system to automate keratitis and uveitis classification using Deep-learning models which minimizes errors, and improves clinical efficiency. Four Deep-learning models were evaluated: ResNet50 (98% accuracy, 2.7 ms inference time), DenseNet121 (96% accuracy, 3.1 ms inference time), MobileNet_V2 (95% accuracy, 3.24 ms inference time), and ResNet18 (99.01% accuracy, 2.2 ms inference time). Among these, ResNet18 demonstrated the best balance of accuracy and inference speed, making it ideal for real-time clinical approach.

Keywords: Retinal abnormalities, Deep Learning, Vision Transformers, Computer-Aided Diagnosis, Uveitis, Keratitis, Convolutional Neural Network (CNN), Ocular Diagnosis, Artificial Intelligence, Clinical Workflow

