

Non-Invasive AI-Based Retinal Inflammation Detection and Severity Estimation Using OCT B-Scans

Tech ID: 34520 / UC Case 2025-573-0

ABSTRACT

Researchers at the University of California, Davis have developed a machine learning system that accurately detects and estimates retinal inflammation severity in uveitis patients using non-invasive OCT B-scan images.

FULL DESCRIPTION

This technology utilizes a deep learning model trained on OCT B-scan images aligned with fluorescein angiography (FA) to detect presence and severity of retinal inflammation related to uveitis. Leveraging a novel annotation pipeline and explainable AI techniques such as Grad-CAM, it offers a rapid, non-invasive, and cost-effective alternative to invasive FA procedures, providing clinician-level diagnostic support for improved and accessible patient care.

APPLICATIONS

- ▶ Clinical ophthalmology decision-support tools for uveitis diagnosis and monitoring.
- ▶ Integration in OCT imaging platforms and cloud-based diagnostic software.
- ▶ Telemedicine platforms enabling remote inflammation assessment.
- ▶ Pharmaceutical clinical trials requiring standardized inflammatory severity measures.
- ▶ Screening programs in low-resource and pediatric healthcare settings.

FEATURES/BENEFITS

- ▶ Detects retinal inflammation non-invasively without fluorescein dye injection.
- ▶ Provides rapid, automated analysis from standard OCT scans.
- ▶ Delivers high diagnostic accuracy, outperforming fellowship-trained clinicians.
- ▶ Quantifies severity with strong correlation to ground truth standards.
- ▶ Enhances trust and interpretability with explainable AI insights (e.g., Grad-CAM heatmaps).
- ▶ Enables scalable adoption in telemedicine and low-resource settings.
- ▶ Problems Solved Eliminates the invasiveness, cost, and limited accessibility of fluorescein angiography.
- ▶ Identifies subtle signs of retinal inflammation that are difficult to detect clinically.
- ▶ Standardizes and quantifies inflammation severity grading.
- ▶ Expands diagnostics where fluorescein angiography is contraindicated or unavailable, including for pediatric and remote care.
- ▶ Accelerates diagnosis and treatment decisions in uveitis management.

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OTHER INFORMATION

KEYWORDS

artificial intelligence, deep learning, fluorescein angiography, machine learning, optical coherence tomography, retinal inflammation, severity estimation, uveitis diagnosis, visual transformer, Grad-CAM

CATEGORIZED AS

- ▶ **Biotechnology**
- ▶ **Health**
- ▶ **Imaging**

PATENT STATUS

Patent Pending

▶ Medical

▶ **Medical**

▶ Diagnostics

▶ Disease:

Ophthalmology and

Optometry

▶ Imaging

RELATED CASES

2025-573-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ A Multimodal Distributed Sensing Device
- ▶ Headset with Incorporated Optical Coherence Tomography (OCT) and Fundus Imaging Capabilities
- ▶ A High Degree of Freedom, Lightweight, Multi-Finger Robotic End-Effector
- ▶ Haptic Smart Phone-Cover: A Real-Time Navigation System for Individuals with Visual Impairment
- ▶ A Morphing Wing Sailplane-multicopter UAV

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