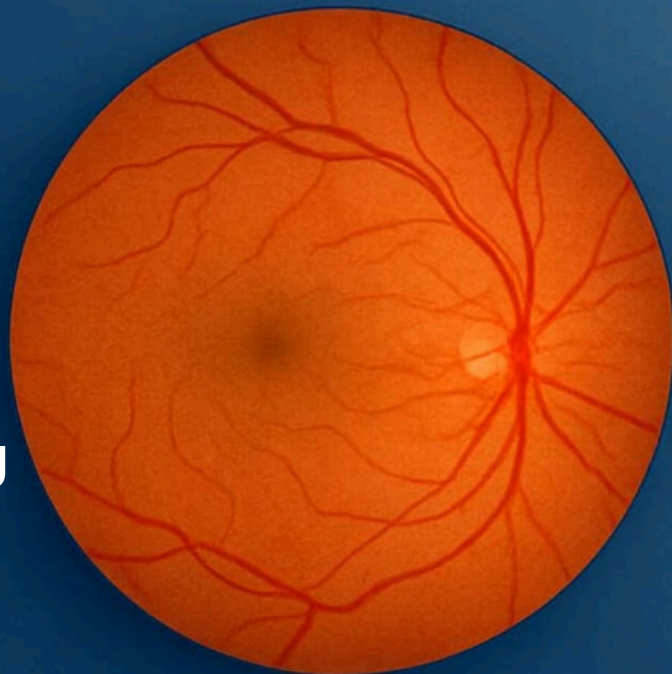


LFA-Net: A Lightweight Platform for Proactive Retinal Health Monitoring



Overview

The LFA-Net project aims to revolutionize retinal image analysis by developing a lightweight, AI-powered platform for retinal vessel segmentation. This solution addresses the critical need for a diagnostically reliable and computationally efficient model, particularly for use in resource-constrained clinical environments like mobile ophthalmology units and point-of-care diagnostics. By leveraging a novel network architecture, LFA-Net provides high-performance segmentation while maintaining a minimal computational footprint. We are seeking investment to transform this groundbreaking research into a scalable, real-world platform for early disease diagnosis.

Solution & Implementation

Our proposed solution is based on the LFA-Net, a lightweight segmentation model that incorporates a new Vision Mamba-inspired attention module called LiteFusion-Attention.

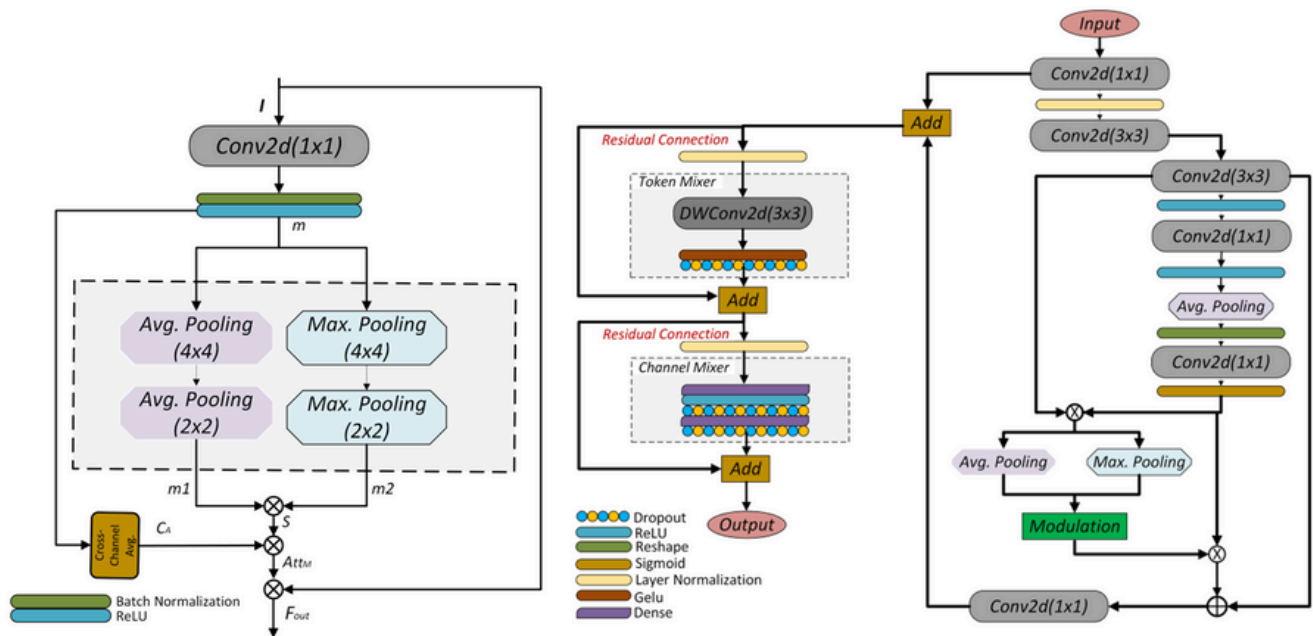
AI Architecture: The core of our solution is the LFA-Net, which balances high accuracy with computational efficiency. It is designed for precise and robust segmentation of vascular structures.

LiteFusion-Attention Module: This innovative attention mechanism efficiently integrates local and global contexts. It uses Vision Mamba-inspired dynamics and modulation-based attention to capture fine details in a lightweight manner.

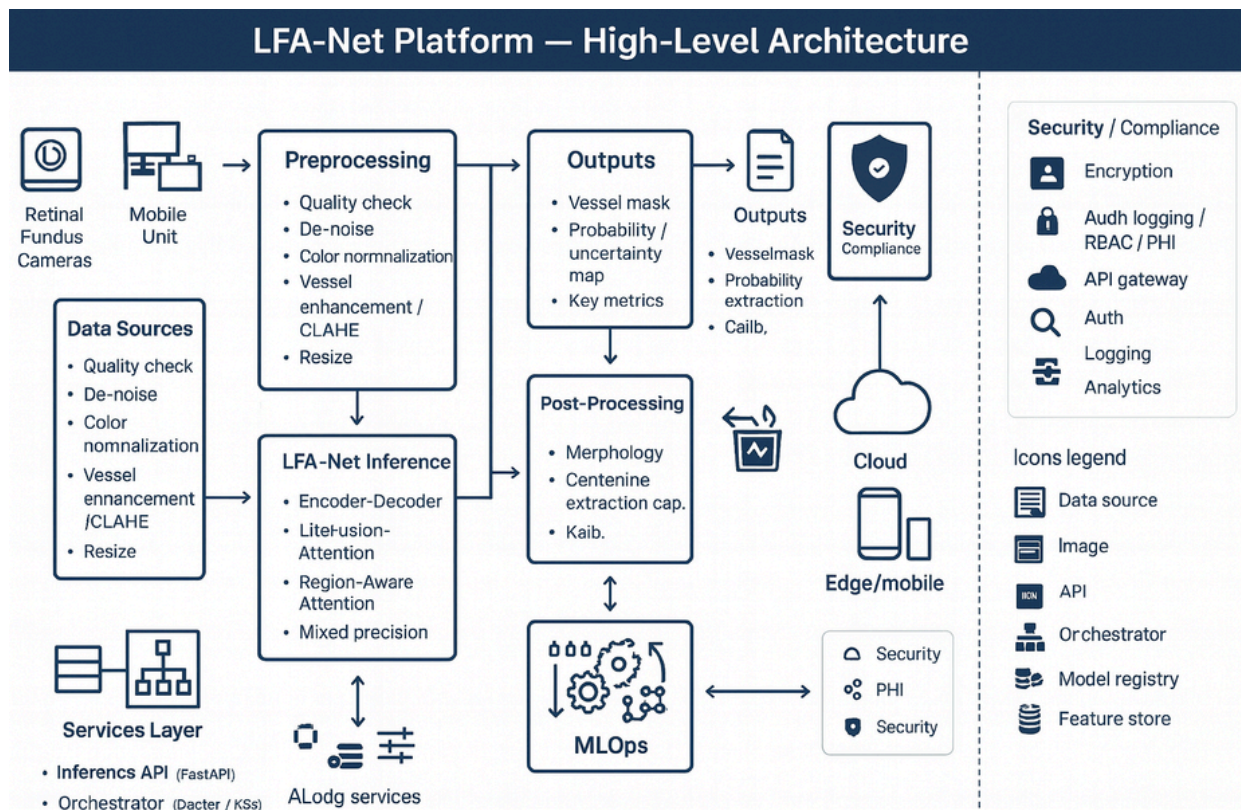
Region-Aware Attention (RAA): We implement a region-aware attention module in selective skip connections to improve spatial context representation without increasing model complexity.

Deployment: The final product will be a platform, potentially a web or mobile application, that allows healthcare providers to quickly and accurately analyze retinal images.

RAM, LiteFusion-Attention Module



High-Level System Diagram



Objectives

- Build a lightweight, user-friendly platform for retinal image analysis based on LFA-Net.
- Integrate the model into web and mobile applications for real-time use.
- Ensure scalability and reliability through cloud and edge deployment.
- Provide accessible diagnostic support for hospitals, clinics, and mobile health units.

Methodology

- Develop backend services for model integration.
- Create intuitive web and mobile frontends for healthcare providers.
- Establish secure cloud infrastructure for data storage and processing.
- Conduct pilot testing in clinical and mobile ophthalmology settings.
- Refine deployment for low-resource environments and regulatory compliance.

Significance

- Delivers a practical diagnostic tool for early detection of retinal and systemic diseases.
- Provides an affordable, deployable AI solution for low-resource healthcare settings.
- Bridges the gap between research and real-world adoption of lightweight AI.
- Contributes to global efforts for accessible, point-of-care diagnostics.

Expected Outcomes

- Delivers a practical diagnostic tool for early detection of retinal and systemic diseases.
- Provides an affordable, deployable AI solution for low-resource healthcare settings.
- Bridges the gap between research and real-world adoption of lightweight AI.
- Contributes to global efforts for accessible, point-of-care diagnostics.



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