Define Problem Statement

Diabetic Retinopathy Detection System

PROBLEM STATEMENT

"Healthcare professionals need an efficient, accurate, and accessible way to screen diabetic patients for retinopathy because current manual screening methods are time-consuming, expensive, and not scalable, resulting in late detection and preventable vision loss."

KEY CHALLENGES

- **Limited Specialist Availability:** Shortage of ophthalmologists, especially in rural areas
- **Manual Screening Bottleneck:** Time-consuming analysis creates delays (days to weeks)
- **Inconsistent Diagnosis:** Subjective interpretation leads to variability
- **High Costs:** Traditional screening programs are expensive and not scalable
- **Late Detection:** Many patients diagnosed only after irreversible damage
- **Patient Volume:** Growing diabetic population overwhelms screening capacity

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IMPACT STATISTICS

- **463 million** adults worldwide have diabetes
- **1 in 3** diabetic patients develop diabetic retinopathy
- **Early detection** can prevent 95% of vision loss cases
- **DR causes 2.6%** of global blindness cases

MEDICAL CONTEXT

Diabetic Retinopathy progresses through five stages: 1. No DR 2. Mild Non-Proliferative DR 3. Moderate Non-Proliferative DR 4. Severe Non-Proliferative DR 5. Proliferative DR

Critical Issue: Symptoms often don't appear until advanced stages when treatment options are limited.

TARGET AUDIENCE

Primary Users: - Ophthalmologists, general practitioners, optometrists - Medical technicians operating screening programs - Hospitals, diagnostic centers, rural health centers

Secondary Beneficiaries: - Diabetic patients requiring regular screening - Healthcare administrators and public health organizations

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PROJECT SCOPE

In Scope: - Automated 5-class DR classification from fundus images - Web-based interface with user authentication - Real-time prediction with confidence scores - Prediction history storage

Out of Scope: - Treatment recommendations, EHR integration, mobile app - Real-time video analysis, other eye diseases

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SUCCESS CRITERIA

Quantitative: - Classification accuracy ≥ 85% - Prediction time < 5 seconds - User satisfaction ≥ 4/5

Qualitative: - Reduced waiting time for results - Increased screening accessibility - Improved early detection rates - Positive healthcare professional feedback

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OPPORTUNITY

By developing this AI-powered system, we can: - **Democratize Access:** Enable screening without specialists - **Improve Efficiency:** Reduce diagnosis time from days to seconds - **Enhance Accuracy:** Provide consistent, objective classification - **Scale Screening:** Handle large patient volumes cost-effectively - **Prevent Blindness:** Enable early intervention through timely detection