

Eyes as Windows to Health: Integrating an Efficient, Generalizable AI Model into a Simple Mobile AI Retina Tracker (SMART) to Revolutionize Ocular and Systemic Healthcare

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Eyes are Windows to Health

OCULAR

Diabetic Retinopathy
Glaucoma
Cataract
Macular Degeneration

OPTIC NERVE

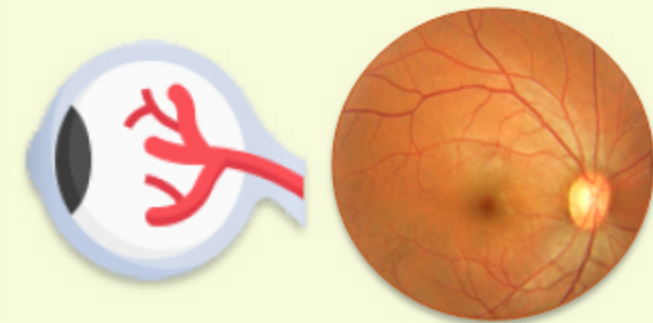
Optic Neuritis
Papilledema
Optic Atrophy
Ischemic Optic Neuropathy

NEUROLOGICAL

Alzheimer's Disease
Parkinson's Disease
Multiple Sclerosis
Traumatic Brain Injury

AUTO-IMMUNE

Systemic Lupus
Rheumatoid Arthritis
Sarcoidosis
Behçet's Disease



METABOLIC

Diabetes Mellitus
Hyperlipidemia
Metabolic Syndrome
Thyroid Eye Disease

INFECTIONS

HIV/AIDS- CMV
Tuberculosis
Syphilis
Toxoplasmosis

RENAL

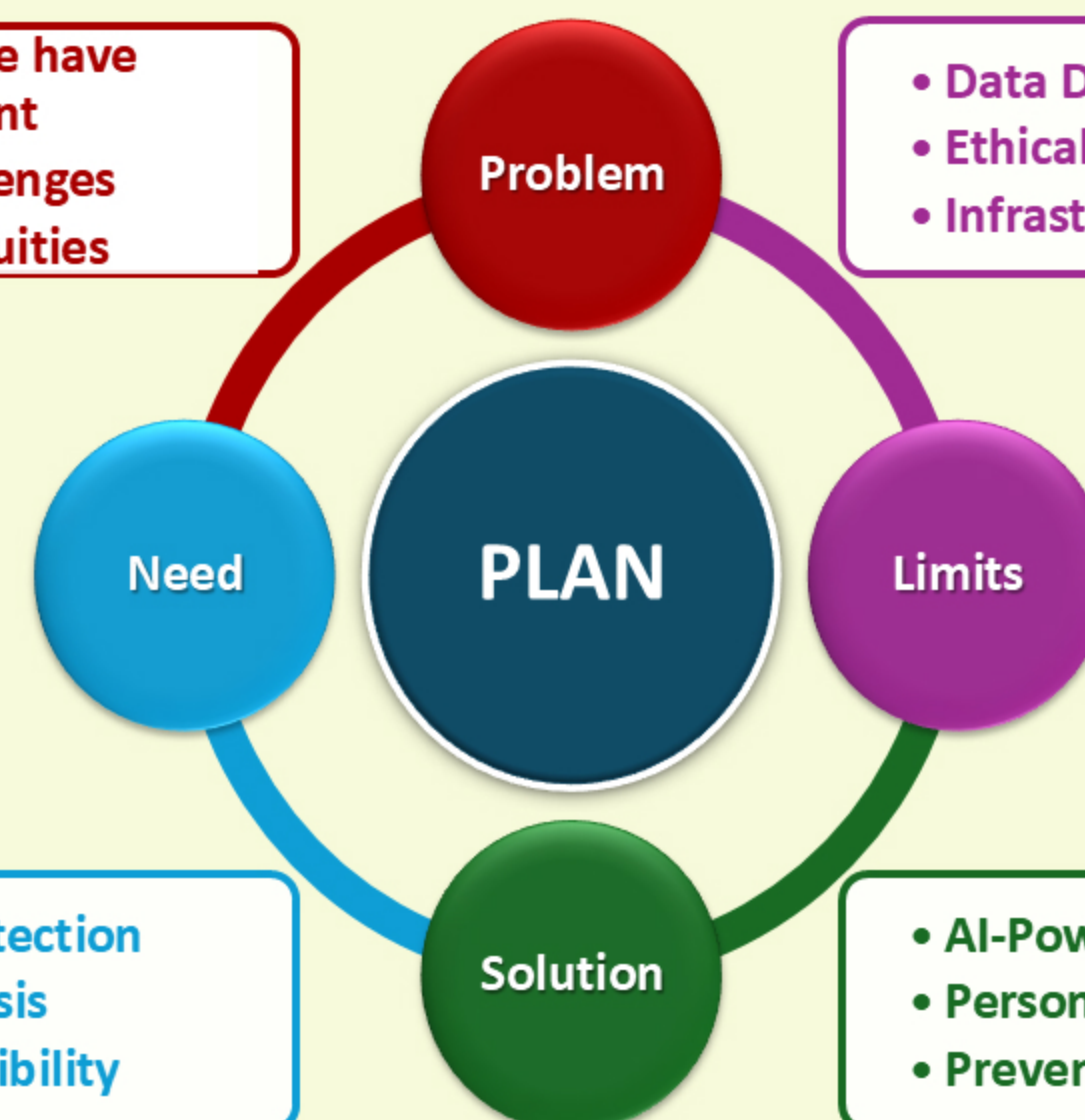
Chronic Kidney Disease
Renal Artery Stenosis
Uremic Retinopathy

CARDIOVASCULAR

Hypertension
Atherosclerosis
Stroke
Coronary Artery Disease

Research Problem and Solutions

- 2.2 billion people have vision impairment
- Diagnostic Challenges
- Healthcare Inequities

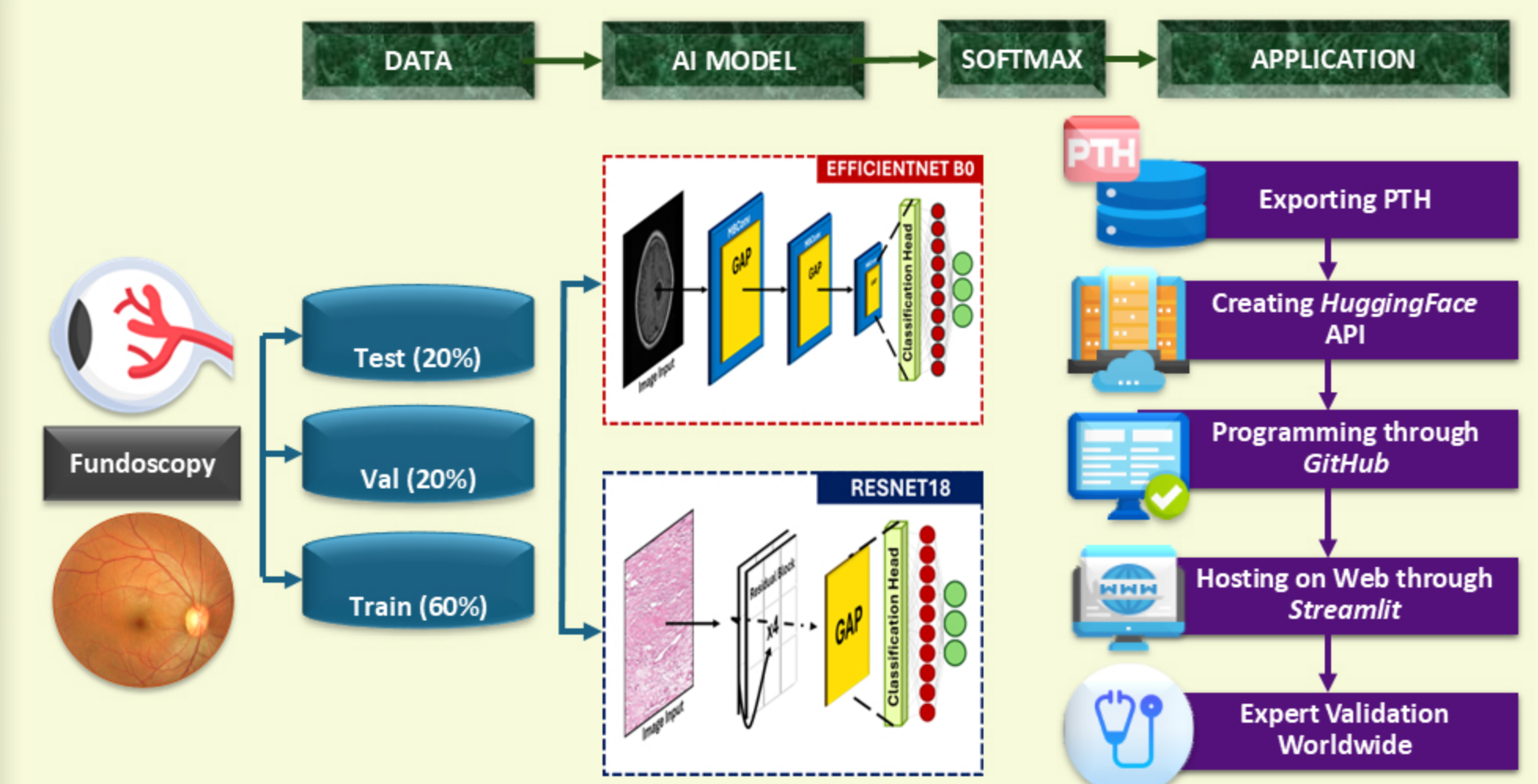


- Data Diversity & Bias
- Ethical Concerns
- Infrastructure Limitations

- Early disease Detection
- Accurate Diagnosis
- Universal Accessibility

- AI-Powered Detection
- Personalized Eyecare
- Preventive Healthcare

Research Design and Methodology

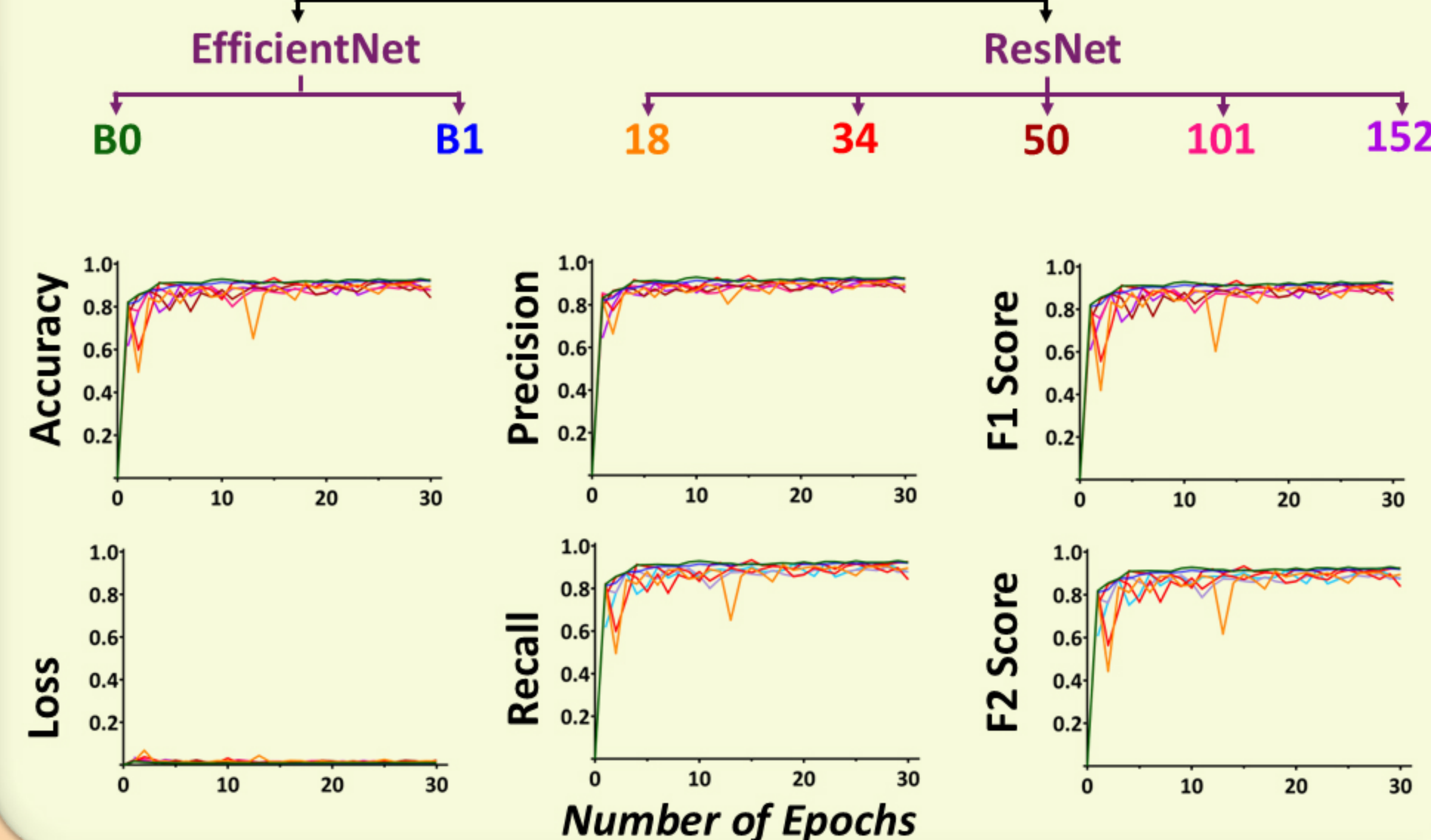


Our research encompassed three phases:

- Evaluating state-of-the-art deep learning architectures on retinal images
- Developing a universally accessible multiplatform SMART application
- Validating accuracy in diverse ocular and systemic diseases

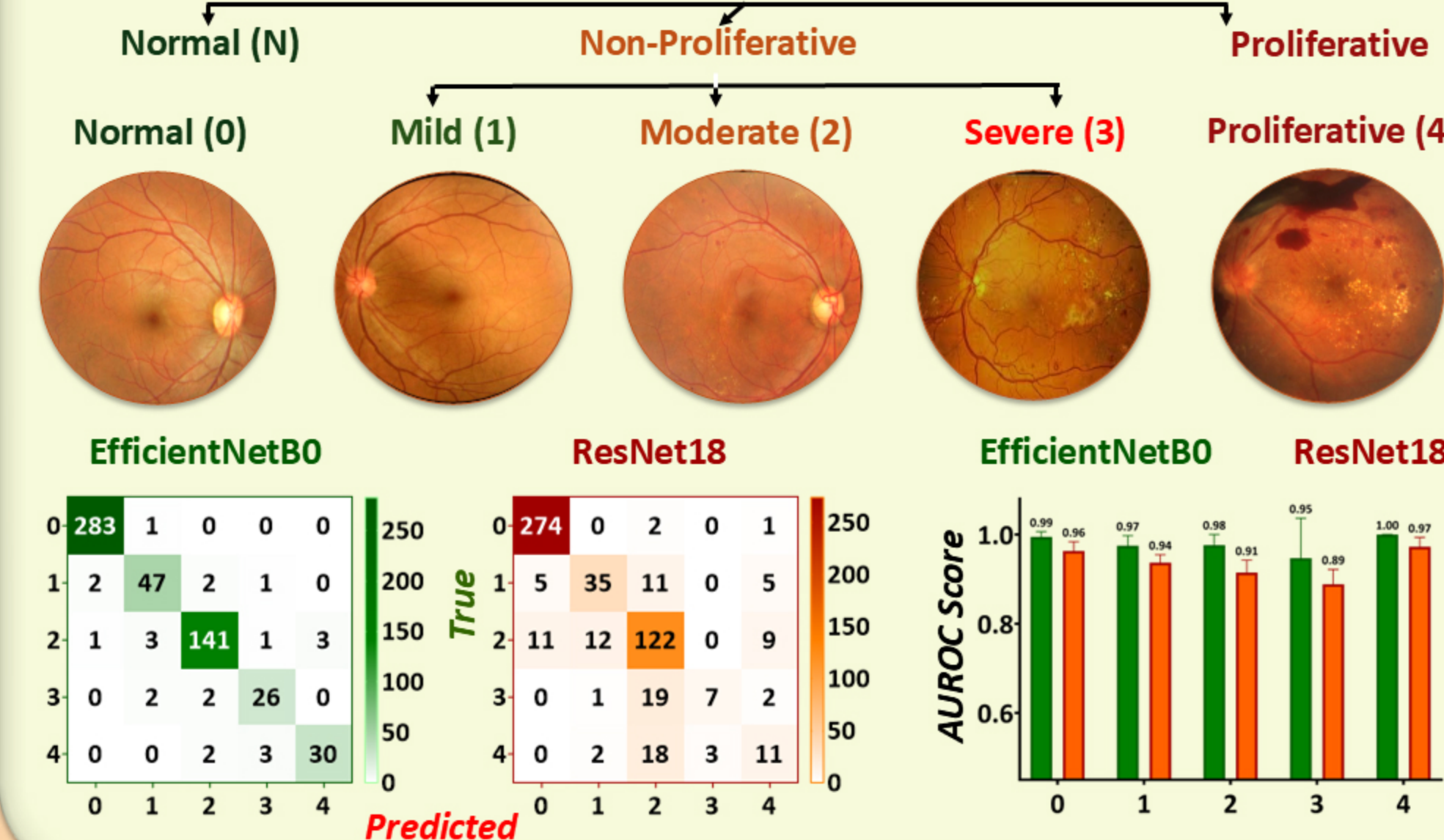
Evaluation of AI Architectures

AI Architectures



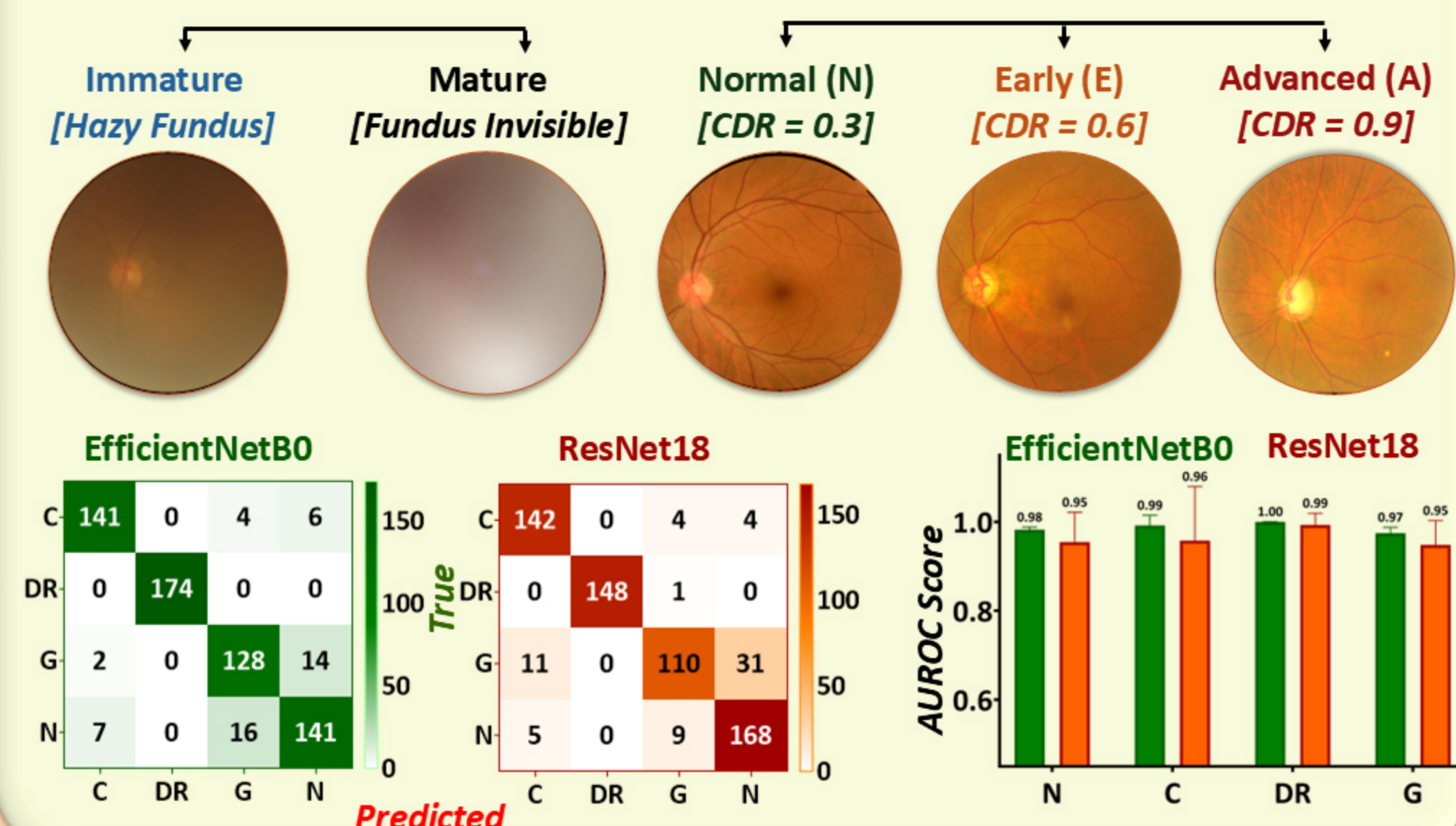
Staging of Diabetic Retinopathy

International Clinical Diabetic Retinopathy (ICDR) Classification

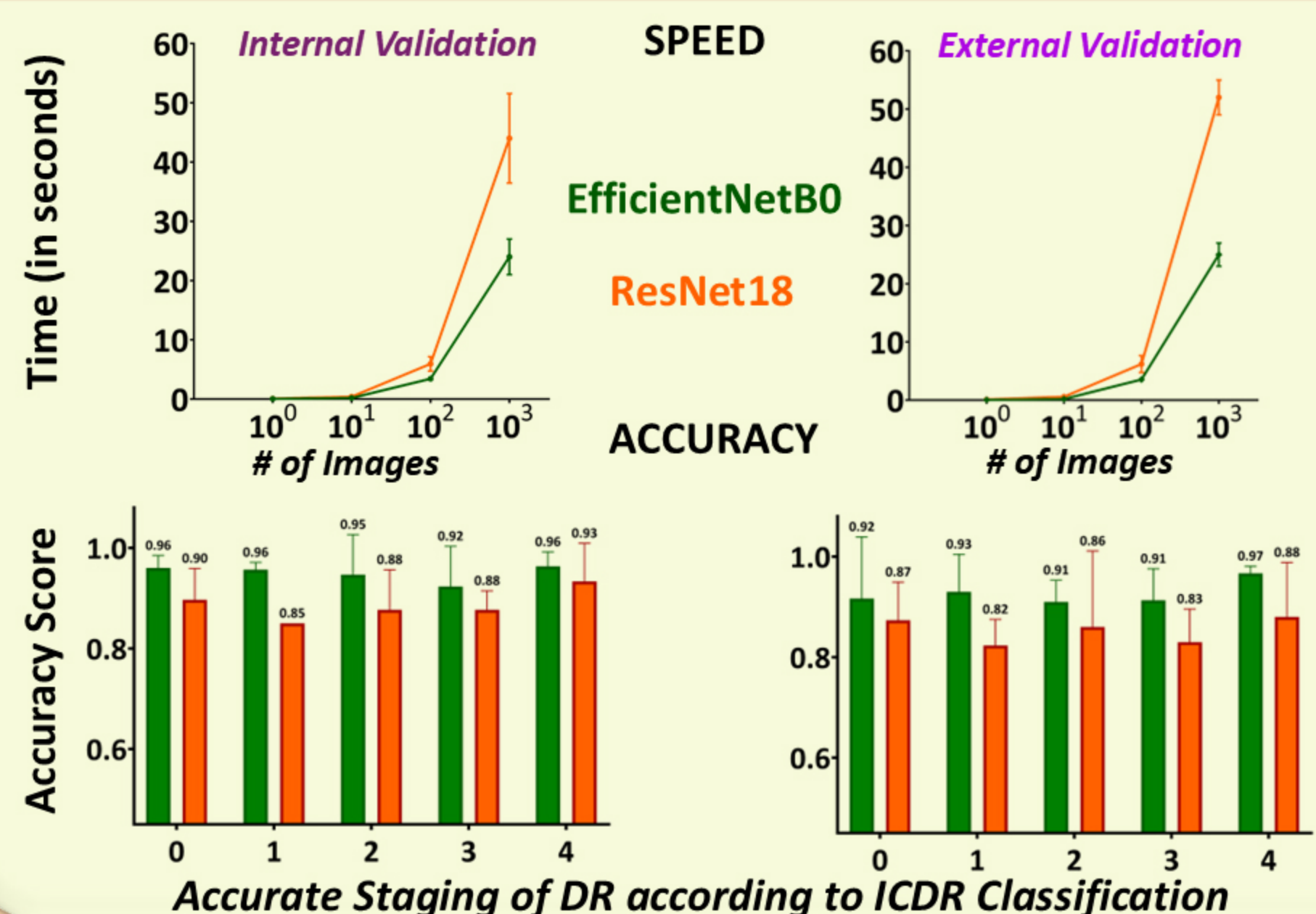


Classification of Ocular Diseases

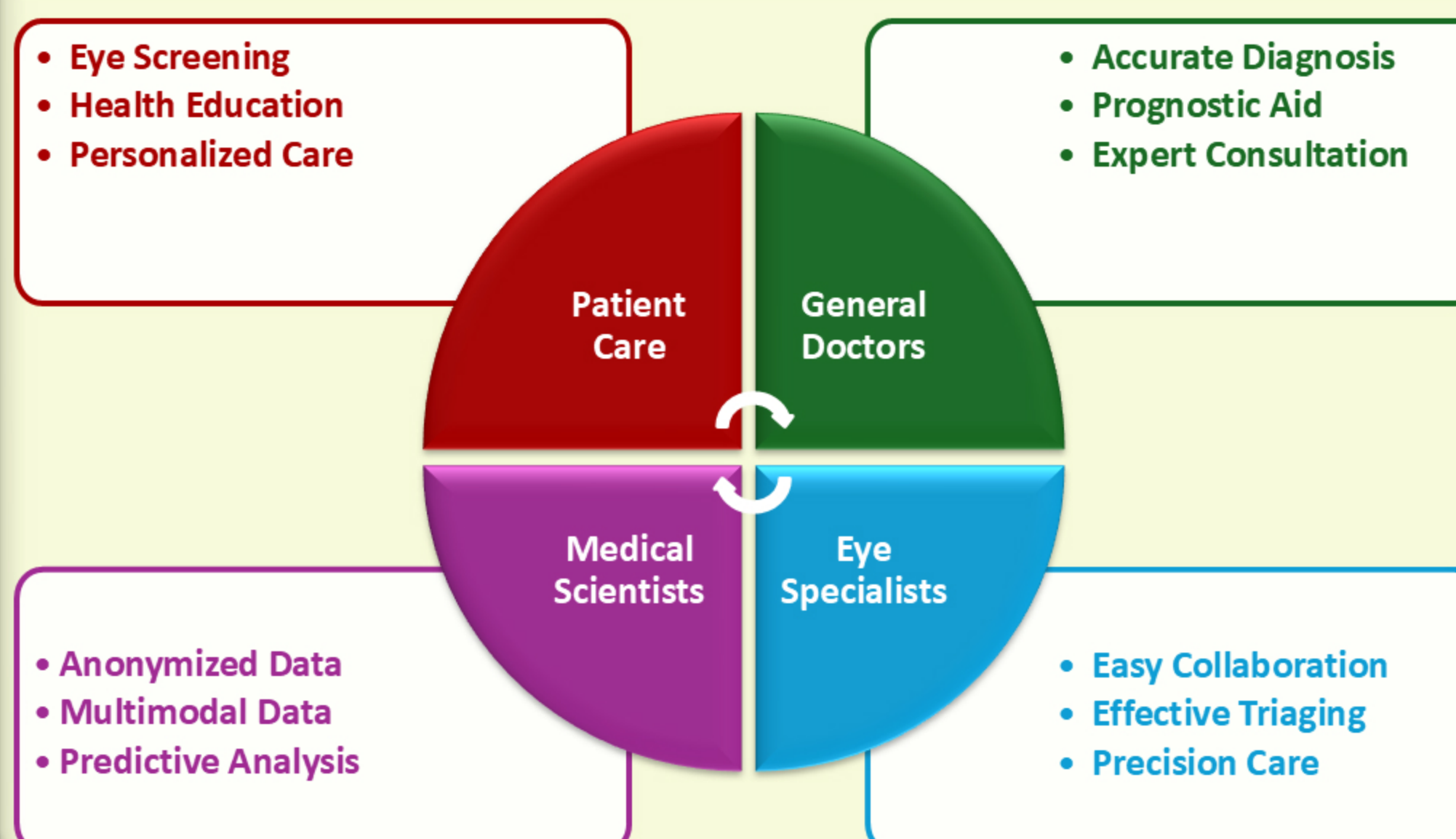
Cataract (C) Classification



Evaluation of App Performance



Significance and Impact of this Study



- Eye Screening
- Health Education
- Personalized Care

- Accurate Diagnosis
- Prognostic Aid
- Expert Consultation

- Anonymized Data
- Multimodal Data
- Predictive Analysis

- Easy Collaboration
- Effective Triage
- Precision Care

Acknowledgments and Credits

Diverse Datasets sourced from Global Sources

Glaucoma Fundus
Glaucoma
USA

MESSIDOR
Diabetes
France

APTOS, IDRiD
Diabetes
India

JSIEC
Multiple Ocular Diseases
China

OculAI.org

Clinicians across the globe for their independent validation

Funduscopy Images: Joint Shantou International Eye Centre.

Icons: Flaticon.

Illustrations: Microsoft PowerPoint and Canva.

Graphs: Python and GraphPad Prism 10.4.2.