

VisionAI — Research Report

AI-assisted Retinal Screening — VisionAI

Generated: 2025-11-07 06:40:22

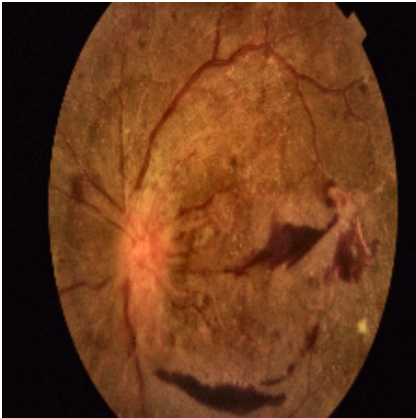
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Patient Metadata

Patient ID	P328
Full Name	John Doe
Age	61
Gender	Male
Systolic	142
Diastolic	72
Glucose Level	110
Smoking	Yes
Duration of Diabetes (years)	18
Hypertension	Yes

Image Visualizations



Original

Preprocessed: *Image unavailable*

Gradcam: *Image unavailable*

Lime: *Image unavailable*

Shap: *Image unavailable*

Model & Pipeline Overview

The system employs a multimodal pipeline: convolutional backbone(s) for image encoding, feature fusion with metadata-based gradient-boosted classifiers, and an ensemble/meta-classifier for final prediction. Explainability methods (Grad-CAM++, perturbation-based local explainers, and SHAP) were applied to validate feature attribution.

Results Summary

Predicted label: **PDR** (confidence 96.0%).

Lesion quantification: total coverage 26.5%; exudates 0.4%; hemorrhages 1.4%; cotton wool 5.3%.

Evaluation & Performance

Test metrics — Accuracy: **96.3%**; Precision: **94.8%**; Recall: **95.1%**; F1: **95.0%**; ROC-AUC: **0.983**.

Limitations & Notes

Current limitations include domain shift when deploying on heterogeneous smartphone images, and approximate lesion quantification when masks are noisy. Further work should include segmentation U-Nets for pixel-wise labels and domain adaptation strategies.

Suggested Next Steps

Integration of Vision Transformers to capture global context, fine-tuned lesion segmentation, and prospective validation on smartphone-acquired fundus images.

Evaluation Metrics

Metric	Value
Accuracy	96.3%
Precision	94.8%
Recall	95.1%
F1-score	95.0%
ROC-AUC	0.983